IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR

DIESEL PROGRESS

FIVE DOLLARS PER YEAR

JUNE, 1954

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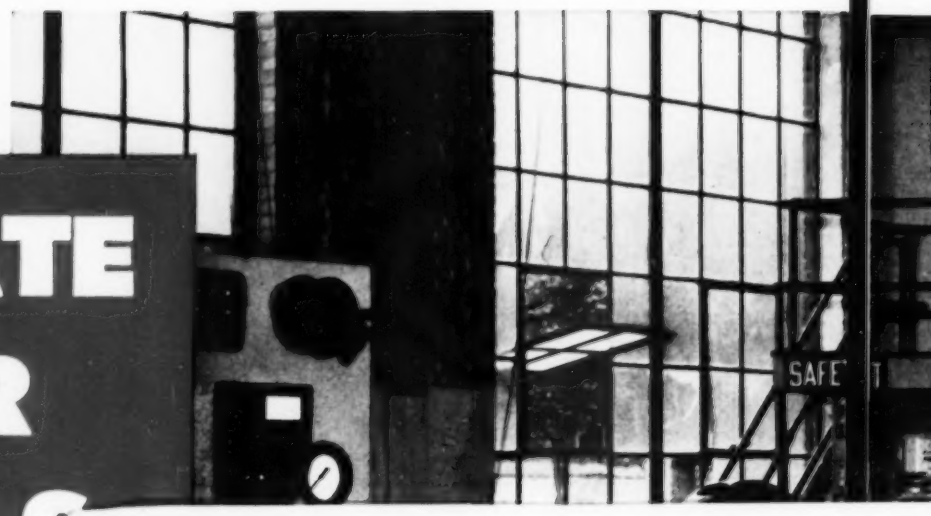

OPERATE YOUR DIESELS FOR LESS...

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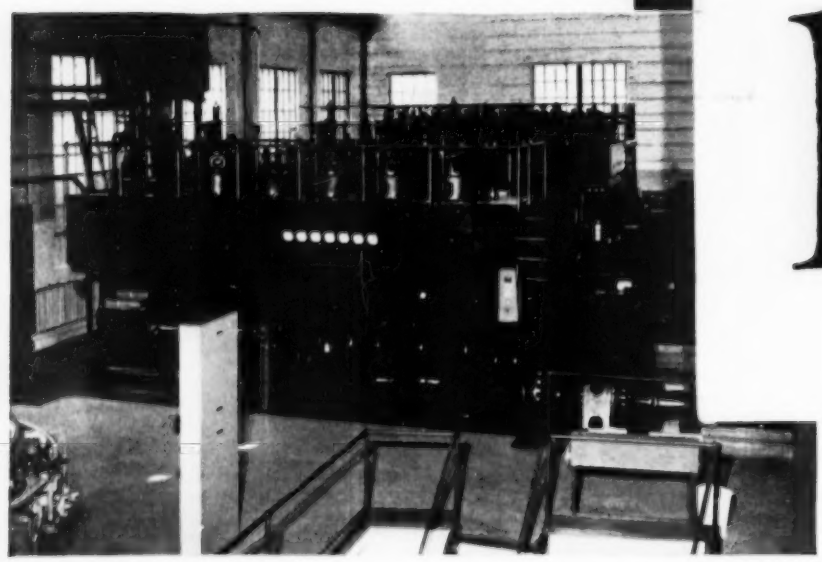

Original diesels got so much better lubrication with Texaco that Texaco was naturally the choice when a new radial diesel was installed.

"We got so much better lubrication with Texaco . . . lower maintenance costs and fuel economy . . . that when we installed a new diesel . . . we naturally chose Texaco to lubricate it. As new diesels go into our plant . . . Texaco is going in with them."

This company uses world famous *Texaco Ursa Oil.*

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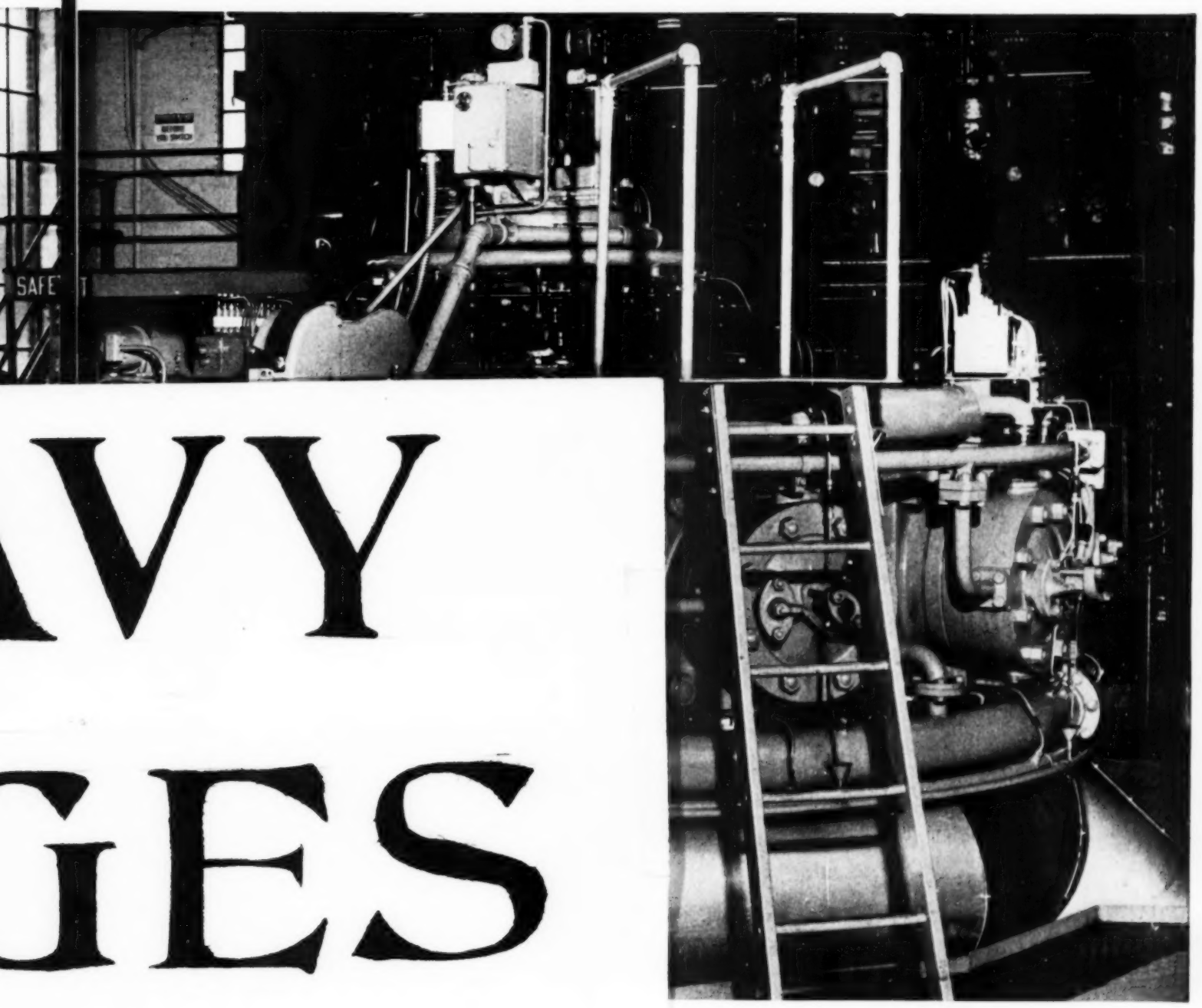


AVY

GES

engines give *more power* with *less fuel* over *longer periods* between overhauls. That is why—

For more than twenty years, more stationary diesel horsepower in the United States has been lubricated with Texaco than with any other brand.

There is a member of the *Texaco Ursa Oil* series for your diesels, whatever their size, nd fuel, or operating conditions. A Texaco Lubrication Engineer will gladly help you select the one to assure greatest efficiency and lowest maintenance costs.

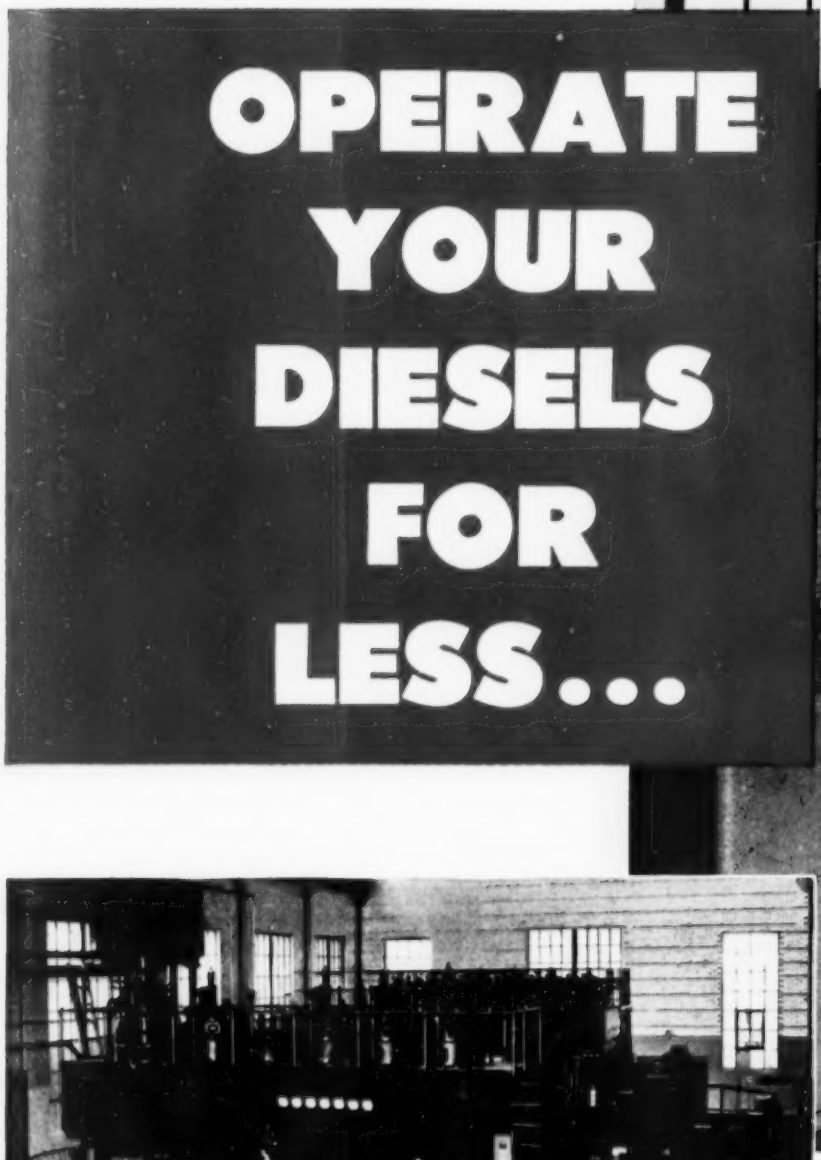
Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

☆ ☆ ☆

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

URSA OILS FOR ALL DIESEL, GAS AND DUAL-FUEL ENGINES

OPERATE YOUR DIESELS FOR LESS...



Original diesels got so much better lubrication with Texaco that Texaco was naturally the choice when a new radial diesel was installed.

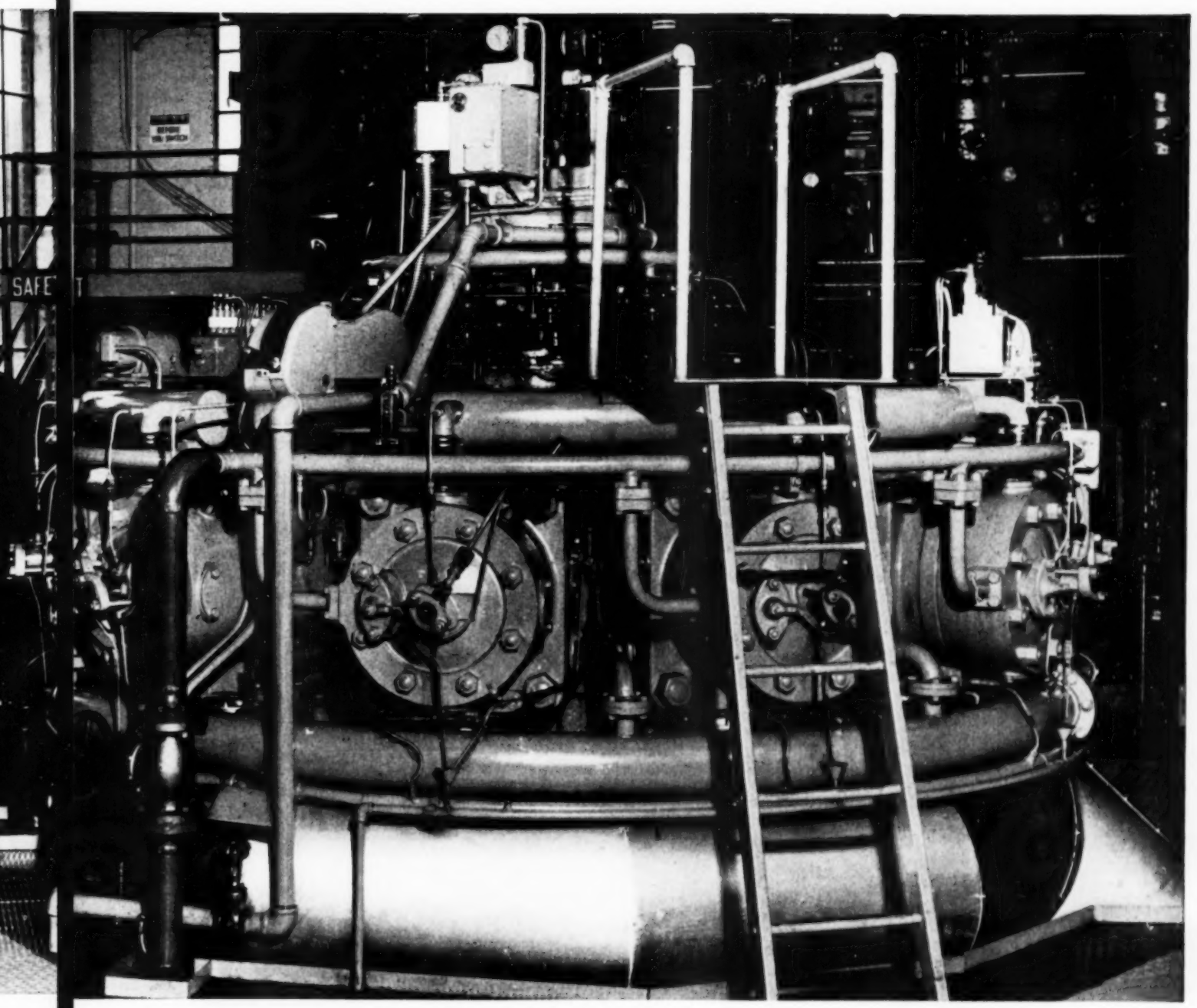
FOLLOW the example of a Michigan utility company (name on request). Here's what they say—

"We got so much better lubrication with Texaco . . . lower maintenance costs and fuel economy . . . that when we installed a new diesel . . . we naturally chose Texaco to lubricate it. As new diesels go into our plant . . . Texaco is going in with them."

This company uses world famous *Texaco Ursa Oil.*

TEXACO

TEXACO



There is a complete line of *Texaco Ursa Oils* especially refined to make diesel, gas and dual-fuel engines give *more power* with *less fuel* over *longer periods* between overhauls. That is why—

For more than twenty years, more stationary diesel horsepower in the United States has been lubricated with Texaco than with any other brand.

There is a member of the *Texaco Ursa Oil* series exactly right for your diesels, whatever their size, type, speed and fuel, or operating conditions. A Texaco Lubrication Engineer will gladly help you select the one to assure greatest efficiency and lowest maintenance costs.

Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

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The Texas Company, 135 East 42nd Street, New York 17, N. Y.

URSA OILS FOR ALL DIESEL, GAS AND DUAL-FUEL ENGINES

DIESEL and GAS ENGINE PROGRESS

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IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR

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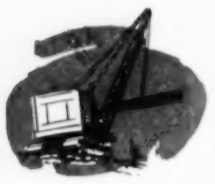
FRONT COVER ILLUSTRATION

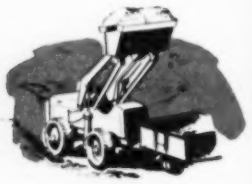
The new San Francisco fireboat *Phoenix*. She features five Cummins diesels, three 550 hp. and two 110 hp. Two of the 550 hp. engines are used for propulsion and/or pumping. Engines were supplied by Watson & Mechan of San Francisco.

Photo Courtesy Watson & Mechan.

NOW LOW-COST HEA

EASY TO INSTALL **COMPLETELY SELF-CONTAINED**





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A VY-DUTY TORQMATIC CONVERTERS

For 40-150 HP Gasoline- or Diesel-Powered Equipment

HERE, for the first time, are Allison TORQMATIC Converters designed for hard-working gasoline- or Diesel-powered equipment in the medium horsepower range.

These new torque converters are true heavy-duty units *priced to compete* with converters designed primarily for passenger cars—*priced to sell for less* than most comparable industrial-type converters.

And they fit your equipment with little or no change in your design.

Easy installation

New Allison TORQMATIC Converters are completely self-contained for simplified flexible installation—feature integral oil system including charging pump, oil cooler and oil sump. No outside oil lines required. Integral gear drive for easy mounting.

Standard SAE #3 mounting dimensions and conventional internal-external drive gear like that used in ordinary clutch power take-offs simplify installation.

Three different models give you a wide selection of torque ratio and capacity.

Options include front disconnect clutch and adapter, rear disconnect clutch adapter, standard flange as shown, industrial shaft with or without governor drive and oil cooler.

Why use a torque converter?

Your equipment lasts longer with an Allison TORQMATIC Converter transmitting power because it protects engines and driven equipment from harmful shock loads—one of the main causes of equipment breakdowns.

And you get more work from your units, too. New Allison TORQMATIC Converters multiply engine torque up to 3½ times and also provide more production because they broaden your engine's effective horsepower range. When torque output equals load demand the TORQMATIC Converter acts as a fluid coupling to conserve fuel and boost engine life.

Ask your engine or equipment manufacturer about Allison TORQMATIC Converters for your hard-working 40- to 150-horsepower units or mail the coupon.

GM GENERAL MOTORS

Allison

TORQMATIC DRIVES

Allison Division of General Motors
Box 894D, Indianapolis 6, Ind.

Please send me Bulletin SA 1031

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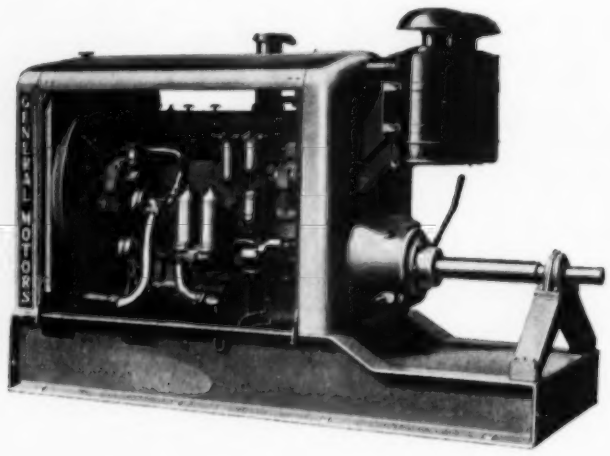
Position_____

Company_____

Address_____

NOW 300 HORSEPOWER



in GM "6-110" diesel engine

Improved Design Gives Still More Power Per Pound From Same Size Unit

Want more power—and production—from your heavy-duty equipment?

Stymied because you can't fit a higher-horsepower Diesel into your units?

Now you can get the power you need—and the increased production you want—with a new 300-horsepower General Motors "110" Diesel—the engine that delivers more torque in the working range. And, you can get them with no increase in engine size or weight.

Higher horsepower means faster operating speeds—high torque means more working power—for operators of all kinds of heavy-duty units.

In off-highway trucks this combination means better hill-climbing, more trips per day, bigger pay loads.

In shovels it means faster digging and loading, more yardage, lower maintenance costs.

In drilling rigs it means more hole per day, faster round trips.

In tractors it means more power for pulling, pushing or "dozing."

Get full details on the new, more powerful GM Series 110 Diesels from your GM Diesel distributor. Have him show you that GM Diesels cost less to buy, less to run and less to maintain than any other Diesel.

GM GENERAL MOTORS DIESEL POWER

DETROIT DIESEL
ENGINE DIVISION
GENERAL MOTORS • DETROIT 28, MICHIGAN
Single Engines . . . 16 to 300 H.P. Multiple Units . . . Up to 864 H.P.

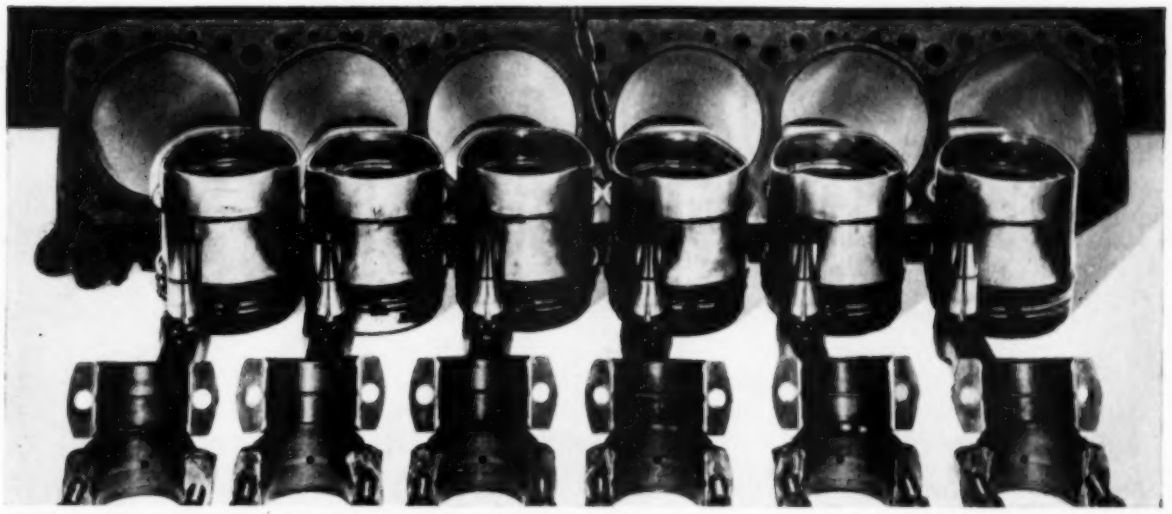
Standard Engineer's Report

CASE HISTORY

PRODUCT RPM Delo Oils

FIRM Osbourn Trucking Company, Los Angeles, Calif.

Only .0035" rod bearing wear after 960,042 miles!



THESE ORIGINAL BEARINGS, CONNECTING RODS, AND WRIST PINS from a 324-H.P. Hall-Scott engine are clean and in good condition after 960,042 miles! In running up this outstanding record on line hauls across the Mojave Desert to Las Vegas, the Osbourn Trucking Company, Los Angeles, used RPM DELO Special Lubricating Oil exclusively. It held wear down to only 0.0035" maximum on rod bearings, 0.0025" on mains and only 0.003" on the crankshaft. Also shown, the last set of rings and pistons used in the engine, went 321,468 miles. Note their cleanliness.

Ralph Hagopian, President of Osbourn Trucking Co., uses RPM DELO Special Lubricating Oil to cut maintenance costs on all of his trucks, which operate on propane and butane.

How RPM DELO Oils reduce wear, corrosion, oxidation in all heavy-duty engines

A. Contain special additives that provide metal-adhesion qualities...protect parts whether hot or cold, running or idle.

B. Anti-oxidant resists deterioration of oil and formation of lacquer...prevents ring sticking. Detergent keeps parts clean...helps prevent piston scuffing.

C. Special compounds stop corrosion of any bearing metal and foaming in crankcase.

FREE FOLDER tells you about all the RPM DELO Oils and how they meet every heavy-duty engine condition. Write or ask for it today.

FOR MORE INFORMATION about petroleum products of any kind or the name of your distributor, write or call any of the companies listed below.

RPM DELO LUBRICATING OILS

TRADEMARK "RPM DELO" REG. U.S. PAT. OFF.

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20 • STANDARD OIL COMPANY OF TEXAS, El Paso
THE CALIFORNIA OIL COMPANY, Barber, New Jersey • THE CALIFORNIA COMPANY, Denver 1, Colorado

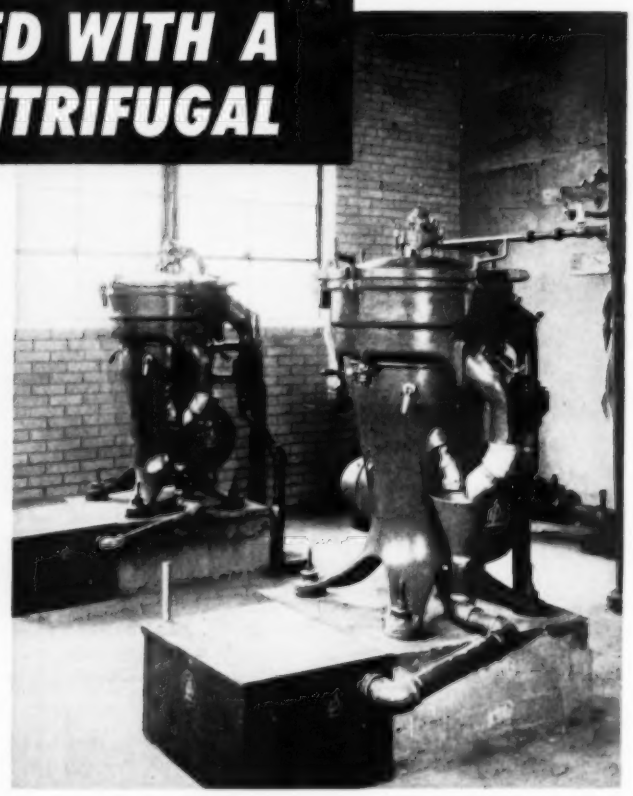
TO CUT FUEL COSTS..... BURN RESIDUALS, PURIFIED WITH A DE LAVAL CENTRIFUGAL

Many diesel-powered plants, ashore and afloat, are successfully burning heavy fuels with resulting large economies*.

They are purifying the residuals with De Laval Oil Purifiers—the most effective means ever devised for the purpose, as proved by efficiency comparison tests.

De Laval Oil Purifiers remove a *maximum* amount of incombustible solids—and do it at constant operating efficiency.

It will pay you to investigate the profit possibilities of burning a less costly fuel, purifying it the *De Laval* way. Write for complete information.



FOR EXAMPLE...

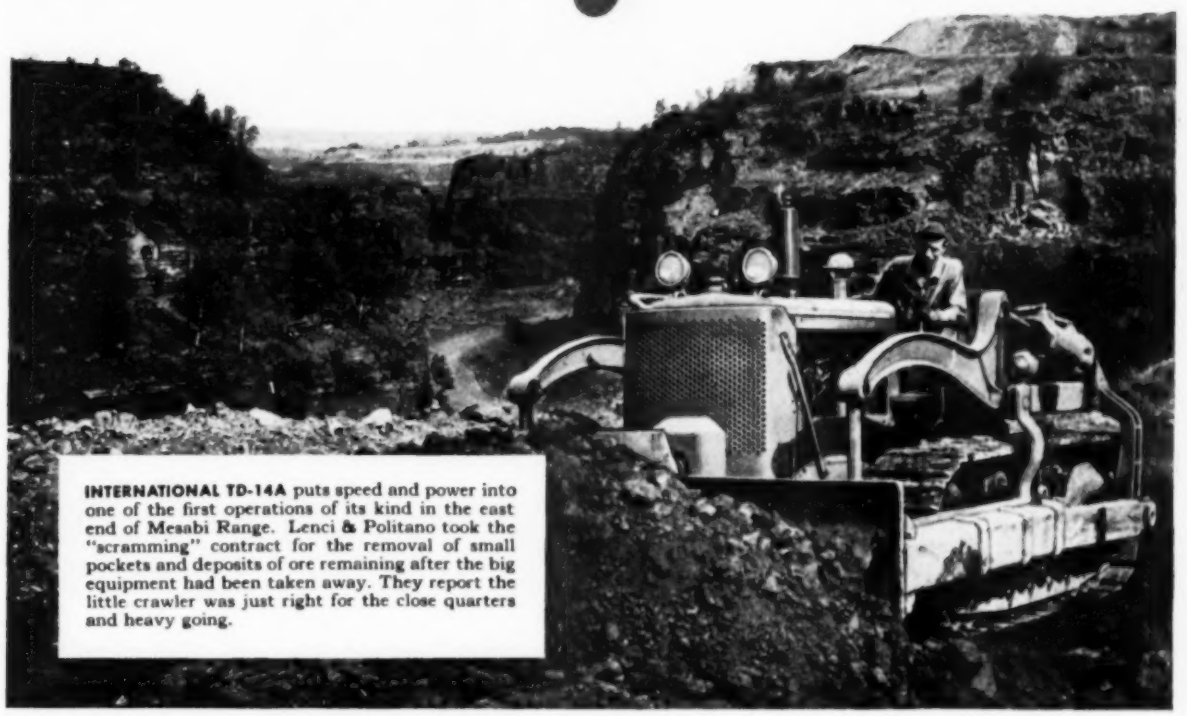
The Keystone Heights, Florida, plant of the Clay Electric Co-op burns straight residual fuels ranging in viscosity from 110 to 166 Furol at 122° F. and in API gravity from 13.5 to 9.4, running them through a De Laval Purifier. The savings, says the Chief Engineer, amount to as much as *$4,500 per month.*

THE DE LAVAL SEPARATOR COMPANY
Poughkeepsie, New York ● 427 Randolph St., Chicago 6
DE LAVAL PACIFIC CO., 61 Beale St., San Francisco 5

DE LAVAL

HEAVY OIL PURIFIERS

"Scramming" on the Mesabi



INTERNATIONAL TD-14A puts speed and power into one of the first operations of its kind in the east end of Mesabi Range. Lenci & Politano took the "scramming" contract for the removal of small pockets and deposits of ore remaining after the big equipment had been taken away. They report the little crawler was just right for the close quarters and heavy going.

INTERNATIONAL Crawler makes a big impression on east end of the Range

What's "scramming?" It's cleaning up the small pockets and deposits of ore that remain after main ore body has been worked. It is a job that brings out the special abilities of smaller crawlers in the complete INTERNATIONAL line according to Lenci & Politano, "scramming" contractors in the east end of Mesabi Range.

An INTERNATIONAL TD-14A was used in the operation. Operator Leonard Lehman, who had always handled big crawlers before, has this to say:

"The way that tractor can get around in tight corners and the size of the load it can handle were things I had not expected. It showed me there is a place for the smaller INTERNATIONAL crawler even in such a big operation as mining the Mesabi Range!"

Do you need big power— little power—or somewhere in between? See the man who can fix you up just right, and keep it rolling for you. That's your INTERNATIONAL Industrial Distributor. Get in touch with him soon for a demonstration of "power that pays!"

INTERNATIONAL HARVESTER COMPANY, CHICAGO 1, ILL.

For every move in Earthmoving

ON TRACKS ...ON RUBBER

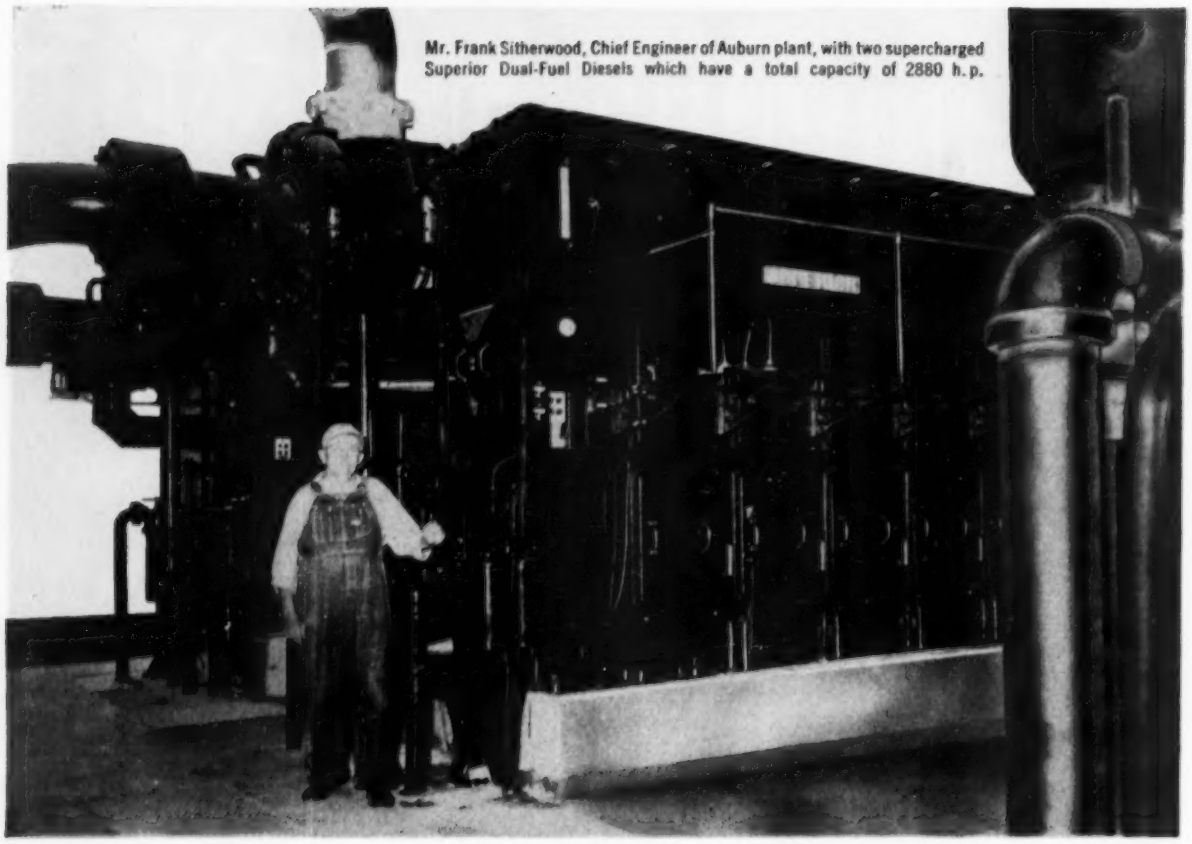
See INTERNATIONAL'S "Job-Phased" equipment

INTERNATIONAL HARVESTER

POWER THAT PAYS

INTERNATIONAL

*Phased Equipment — Machines designed and built to handle each major phase of earthmoving most efficiently and economically.



Mr. Frank Sitherwood, Chief Engineer of Auburn plant, with two supercharged Superior Dual-Fuel Diesels which have a total capacity of 2880 h.p.

Auburn, Nebraska, pays off power plant debt

5 years ahead of schedule!

This year, the Board of Public Works of Auburn, Nebraska, plans to pay the last $76,000 of a bonded debt which totaled $279,000.00, five years ago. This final payment is five years ahead of schedule, for which the Board gives credit to a pair of Superior Dual-Fuel Diesels.

The first Superior, originally a straight diesel rated at 960 h.p., was installed in the power plant in 1946. Dual-fuel equipment was added in 1948, to enable the engine to operate on diesel or natural gas, depending on supply and price.

The following year, the Board produced 190,000 *more* kilowatt hours of electricity for 21,800 *less* dollars. Fuel savings accounted for all but $250 of the total cost reduction!

When Auburn's generating capacity had to be increased in 1949, the Board bought a new Superior supercharged dual-fuel diesel—for obvious reasons—and in 1952, added a supercharger to the first one.

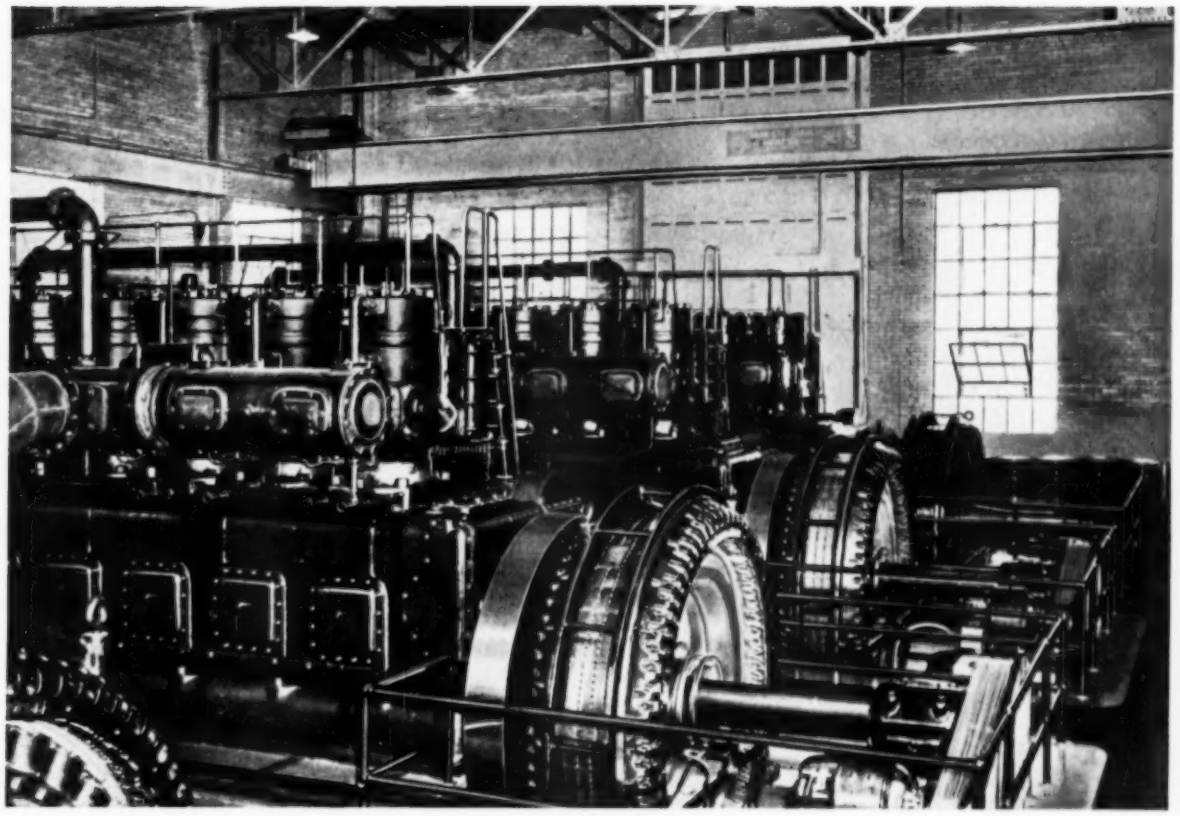
This is just one example of the many outstanding economy records made by Superior and Atlas Diesels. You can easily get more information on the engines to profitably meet your power needs by calling the nearest sales and service office listed below.

DIESEL DUAL FUEL GAS — THE NATIONAL SUPPLY COMPANY — ATLAS Superior DIESEL ENGINES — Superior ENGINES — DISTRIBUTOR OF Lister DIESELS IN U.S.A.

THE NATIONAL SUPPLY COMPANY

ENGINE DIVISION PLANT AND GENERAL OFFICES: SPRINGFIELD, OHIO

SALES AND SERVICE POINTS: Gloucester, Massachusetts • Houston, Texas • Fort Worth, Texas • San Diego, California Oakland, California • Terminal Island, California • Ketchikan, Alaska • Washington, D.C. • Chicago, Illinois • Portland, Oregon • Astoria, Oregon • Casper, Wyoming • Halifax, Nova Scotia • Vancouver, B.C. • Toronto, Ontario • Park Rapids, Minnesota • New York, New York • Seattle, Washington • New Orleans, Louisiana • Pittsburgh, Pennsylvania



"We're Proud of This Plant!"

says Don H. Decker, — Plant Supt., Thumb Electric Cooperative, Ubly, Mich.

Manager Orville Hurford and Mr. Decker are justifiably proud of their 4-diesel engine generating station. The plant has been an outstanding financial success since the day it was first opened. Several times it has occupied #1 position on the REA Running Plant capacity chart.

Mr. Decker writes, "A large part of our operating success we attribute to Sinclair GASCON® D oil. It has given us an excellent rate of consumption while reducing wear. In fact, *cylinder and piston ring wear is much below normal based on other plants of equal capacity.* Something else we appreciate is the timely visits of the Sinclair Lubrication Engineers."

Top quality lubricants plus the assistance of Sinclair Lubrication Engineers are two of the reasons why Sinclair can play a large part in the success of *your* operation. Your local Sinclair Representative will be happy to explain the remaining reasons. Phone him or write Sinclair Refining Company, 600 Fifth Avenue, New York 20, N. Y.

SINCLAIR DIESEL LUBRICANTS

save Wear and Replacement

faster, smoother

The watchwords of today's American railroads—faster, smoother travel—are typical of the Pennsylvania Railroad's stream-liner, the Spirit of St. Louis, which makes the trip between St. Louis and New York an enjoyable experience for the traveler.

Gulf Dieselmotive Oil contributes to the fine performance of the giant Diesel engines that power the Spirit of St. Louis and many other crack trains. Here's how this top quality Diesel locomotive lubricant helps keep maintenance costs down, availability up:

1 Effective detergent action prevents harmful piston ring belt deposits.

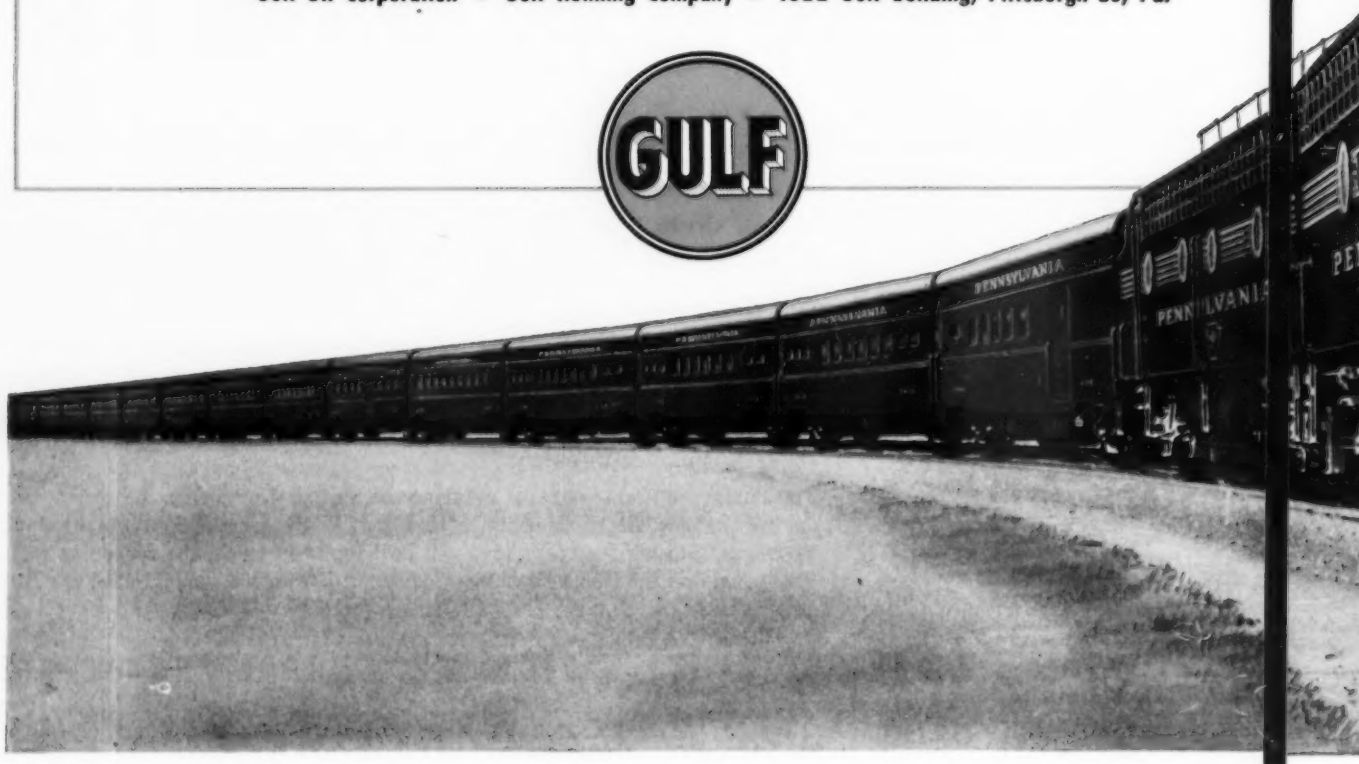
2 Base stocks are selected for their ability to help prevent hard deposits on the piston crown and in the ring belt area.

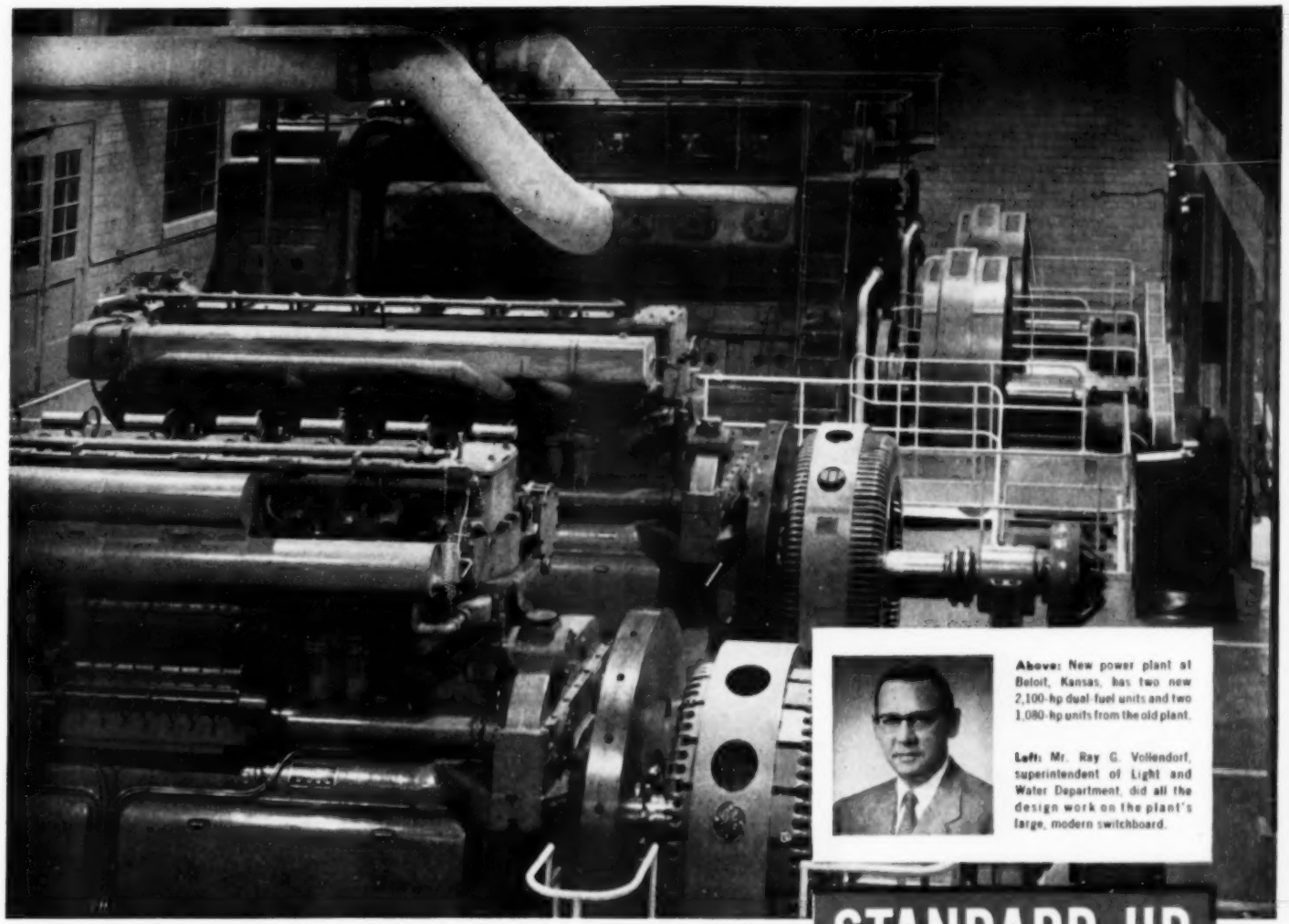
3 100% solvent refining (removing undesirable constituents) insures greater stability and better bearing protection.

Gulf Sales Engineers, experienced in railroad Diesel operation, are always available to aid you in maintaining high standards of lubrication throughout your system. Write, wire, or phone your nearest Gulf office today, and have a Gulf Sales Engineer call.

Gulf Oil Corporation • Gulf Refining Company • 1822 Gulf Building, Pittsburgh 30, Pa.

GULF





Above: New power plant at Beloit, Kansas, has two new 2,100-hp dual-fuel units and two 1,080-hp units from the old plant.

Left: Mr. Ray G. Vollendorf, superintendent of Light and Water Department, did all the design work on the plant's large, modern switchboard.

STANDARD HD
TRADE MARK
OIL

New Beloit, Kansas, plant gets record low maintenance with...

● Acclaimed as one of the municipal showplaces of the Midwest, the new power plant at Beloit, Kansas, is going itself one better in actual performance.

The decision of Mr. Ray Vollendorf, plant superintendent, and city officials to switch to dual-fuel operation has paid dividends. Dual-fuel operation of the two new 2,100-hp units and a 1,080-hp converted unit has reduced fuel cost per kilowatt hour by more than 50%.

Another decision has brought its reward. To STANDARD HD Oil went the job of lubricating the plant's four diesels. Now, after nearly three years' operation, Mr. Vollendorf reports that crankcases are as clean as the day the diesels were placed in service. No rings or bearings have needed to be replaced. Visibility of tool marks on the rings and the over-all excellent condition of the engines indicate that many more hours of service are possible before any overhaul or replacement of parts will be required.

Including the three years' operation of the new plant, the experience of Beloit, Kansas, municipal officials with Standard Oil products covers over 20 years. That experience testifies to the satisfaction and benefits you'll realize through Standard Oil's high quality products and outstanding service. You can reach the Standard lubrication specialist in your area of the Midwest by phoning your local Standard Oil office. Or, write: Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago, Illinois.

STANDARD OIL COMPANY

STANDARD *(Indiana)*

"Have you heard . . . about that boat that just tied up over there? You know, the one that always used to be the last one out . . . last one in . . . and *always* had the smallest catch? Well it's Highliner for the month . . . and all because of something called Re-Powered with O-P."

The gulls may not be talking at your dock, but chances are everyone else is talking about the *new* Fairbanks-Morse Opposed-Piston Diesel engine designed for your power requirements in the 225 to 750 horsepower class.

This is the engine that will fit your present engine compartment—with all accessories engine-mounted—and give you more power and performance!

Hard to believe? Listen to this: This engine is 20% less in length and width . . . weighs about 20 pounds per horsepower . . . has 40% fewer moving parts . . . and because it is a completely packaged unit, can be fitted for about ⅓ the cost of other replacement units.

There's more . . . all of it of interest to *you*. So call your Fairbanks-Morse Marine Specialist today or write Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago 5, Ill.

Model 38F Marine O-P Diesel for main or auxiliary service in the 225 to 750 horsepower class.

FAIRBANKS-MORSE

a name worth remembering when you want the best

DIESEL AND DUAL FUEL ENGINES • DIESEL LOCOMOTIVES • RAIL CARS • ELECTRICAL MACHINERY
PUMPS • SCALES • HOME WATER SERVICE EQUIPMENT • FARM MACHINERY • MAGNETOS

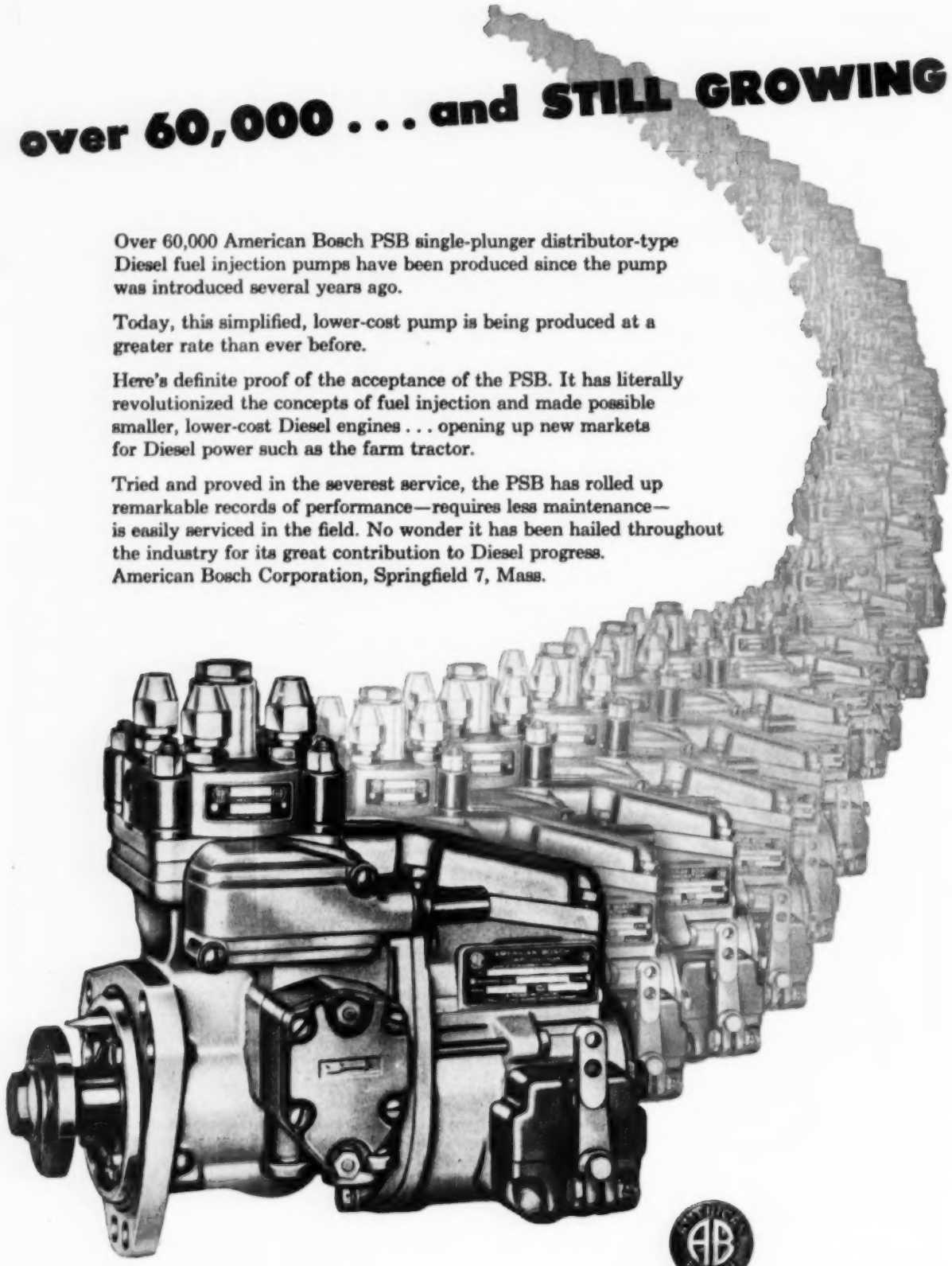
over 60,000 . . . and STILL GROWING

Over 60,000 American Bosch PSB single-plunger distributor-type Diesel fuel injection pumps have been produced since the pump was introduced several years ago.

Today, this simplified, lower-cost pump is being produced at a greater rate than ever before.

Here's definite proof of the acceptance of the PSB. It has literally revolutionized the concepts of fuel injection and made possible smaller, lower-cost Diesel engines . . . opening up new markets for Diesel power such as the farm tractor.

Tried and proved in the severest service, the PSB has rolled up remarkable records of performance—requires less maintenance—is easily serviced in the field. No wonder it has been hailed throughout the industry for its great contribution to Diesel progress.
American Bosch Corporation, Springfield 7, Mass.



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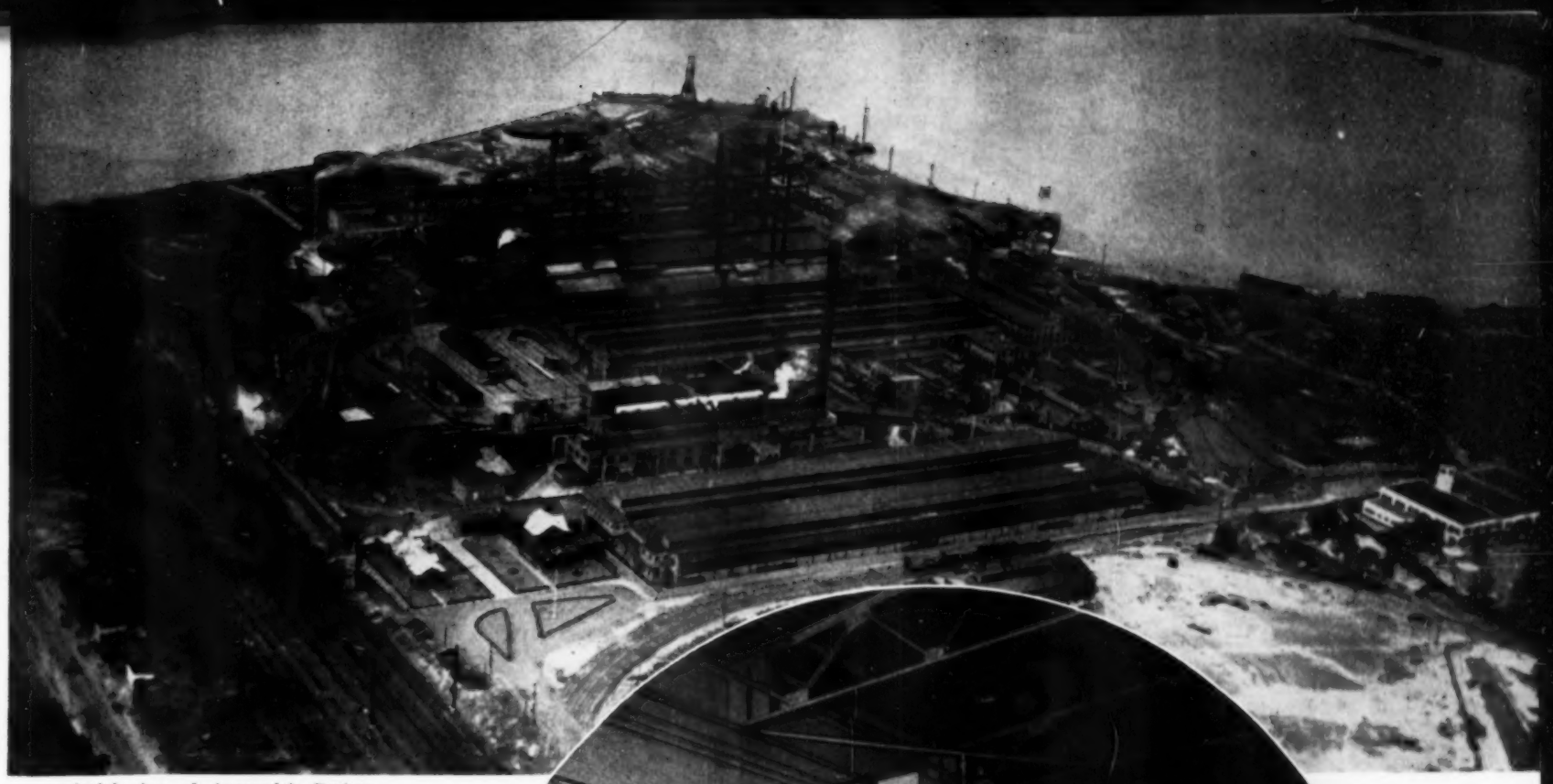
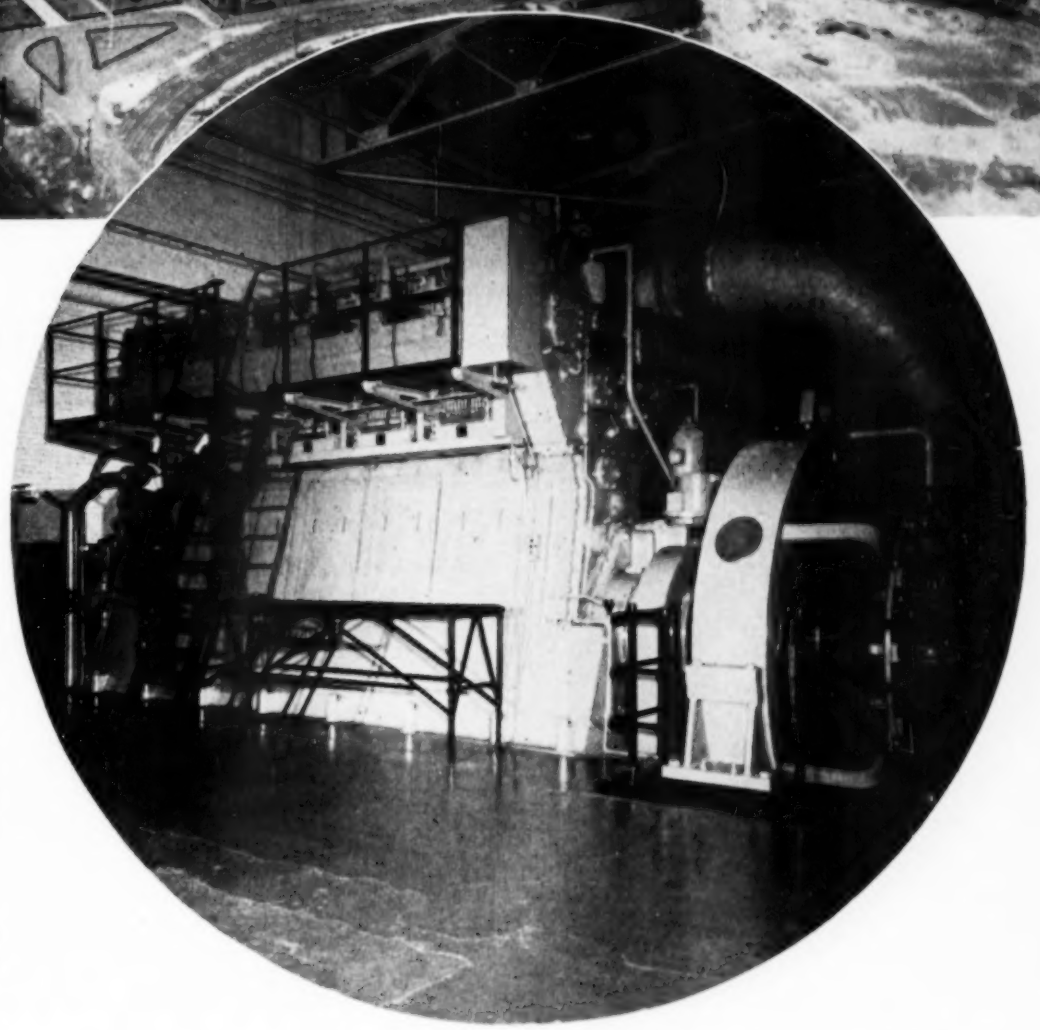
AMERICAN BOSCH



Aerial view of Anaconda's Raritan Copper Works at Perth Amboy, New Jersey. It is the largest copper refinery using the electrolytic process.



W. L. Bennett, assistant chief engineer at the plant starts up the ladder to check the fuel injection pumps on the No. 2 Hamilton diesel. Installed in 1953, the 2,850-hp., Model 621SA, 2-cycle, 6-cylinder, 21½-in. by 27½-in. Hamilton drives a 2,000 kw., 8000-amps., 250-v. dc. General Electric generator at a speed of 250 rpm. The cylinder lubricators are Manzel.

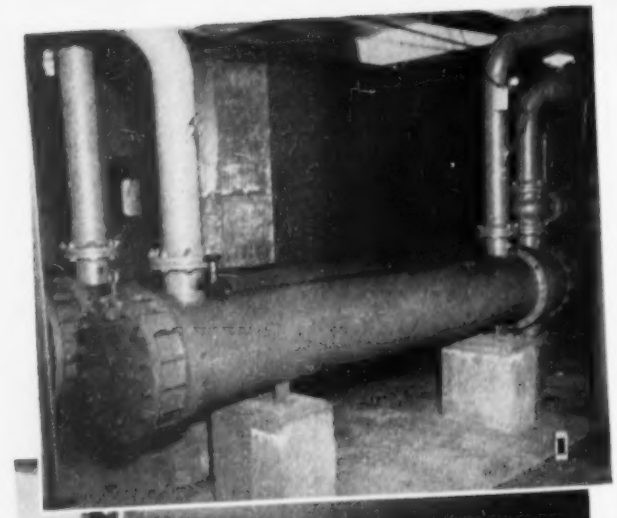
DIESELS EXCEL AT ANACONDA PLANT

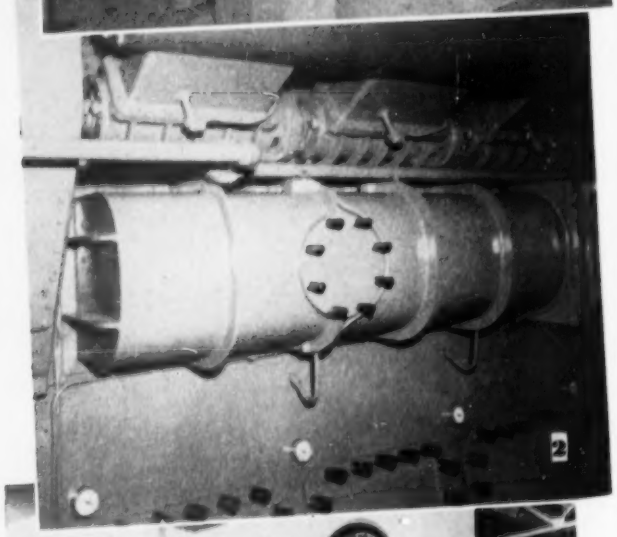
Installed in Preference to New Steam Turbine, Two Baldwin-Lima-Hamilton Diesels Deliver Power at Fuel Rate of 15.39 Kwh./Gal. at Anaconda's Raritan Copper Works

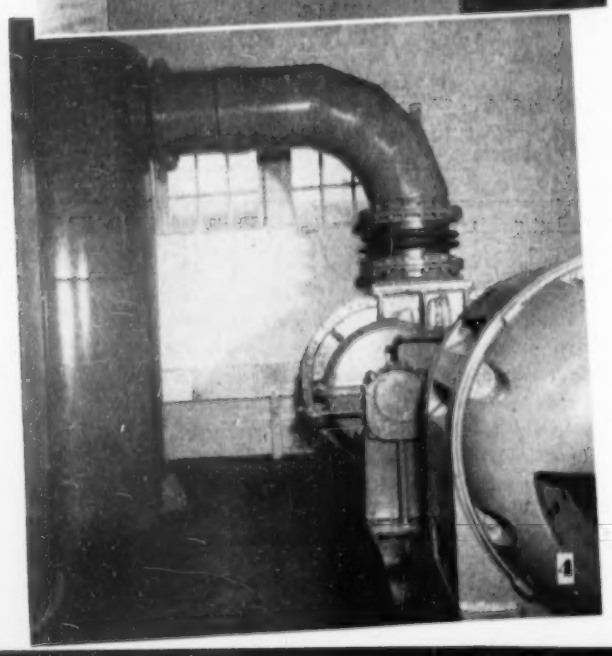
SEEKING to meet the demand for greater power supply, to give its power plant greater flexibility, and at the same time to keep capital costs down, the International Smelting and Refining Company's Raritan Copper Works, at Perth Amboy, N. J., has installed two Baldwin-Lima-Hamilton diesel engines over the past three years to supplement the output of its four steam turbines. Not only have the two 2850-hp. diesels met all three objectives, but they have been operating with high efficiency, producing power at the impressive rate of 15.39 kwh./gal. of fuel.

The International Smelting and Refining Co. is a division of Anaconda Copper Mining Co., of New York. Its Raritan Works, capable of producing 40,000,000 lbs. of refined copper per month, is the largest copper refinery using the electrolytic process in the country. It was to supply additional dc. power for this process that the two Hamilton diesels were put on the line in 1951 and 1953, respectively, becoming the first diesel engines ever installed in the once all steam-powered plant. Through February, 1954, the two Hamilton diesel engines had produced a combined total of 18,904,000 kwh. at the fuel cost of only 6.4 mills/kwh. This represents a consumption of 1,228,050 gal. of #4 Miranda crude oil at a February delivered price of 9.46¢ per gal. For the entire period of operation the engines averaged 15.39 kwh. per gal. Lube consumption was correspondingly low, averaging 6,120 hp. hrs. per gal. during 1953.

The decision to install diesel engines instead of expanding the plant's existing steam turbine equipment was made by Anaconda engineers after a long study of the particular problems involved. Basically it narrowed down to a choice between the two Hamilton engines or a new high-pressure topping turbine, which would operate at an inlet







pressure of 1500 psi. and would exhaust at 165 psi. to the plant's low pressure turbines. The engineers decided in favor of the Hamilton for four significant reasons. First was the problem of flexibility. With two tank houses using the electrolytic process to extract refined from pig copper, Anaconda felt that the varying loads at each house could best be handled by two separate generating units. The comparative ease and speed with which a diesel engine can be put on the line to meet a sudden jump in demand also entered the picture.

Second was the initial cost of equipment and installation. Here the advantages of the diesel engines over the turbine were clearly defined. Not only did the cost of the turbine itself have to be taken into consideration, but the cost of installing a new high-pressure boiler also had to be considered.

Third, was the question of reserve power in the event of an emergency. Should something disrupt the plant's supply of steam, either high or low pressure, the diesels could be used to pick up the major portion of the dc. load until adequate repairs could be made. This would provide invaluable insurance against the possibility of a total plant shutdown. The fourth problem was the most difficult to solve. Since the high-pressure topping turbine would be used to generate dc. power, the problem of balancing its exhaust with the unrelated demands of the plant's low-pressure ac. turbines was a critical one. Although such a balance was considered possible by Anaconda engineers, it would have required such close supervision of the turbines that it was deemed impractical, particularly in the light of the weighty advantages already offered by diesel power.

It was for these reasons, then, that the Anaconda plant installed its first diesel engine, a 2850 hp. six-cylinder, 21½ in. by 27½ in. Baldwin-Lima-Hamilton unit, which it put on the line on April 16, 1951. Two years later, to help supply additional copper for a newly constructed casting furnace, it added a similar Hamilton unit, putting it on the line on April 21, 1953. Driving a pair of 2,000 kw. General Electric dc. generators, these two Hamilton diesel engines have been operating at truly impressive fuel economy and efficiency rates ever since. In 1952, for example, in its first complete calendar year, the #1 engine produced a total of 6,962,000 kwh., consuming 440,100 gal. of crude oil at 15.82 kwh./gal. At the same delivered price for fuel mentioned above, this represents an average fuel cost of only 5.98 mills/kwh.

In 1953, with the #2 Hamilton operating for slightly more than 8½ months, the two diesels generated a total of 10,092,000 kwh., consuming 662,200 gal. of fuel oil at the rate of 15.24 kwh/gal. This represents an average fuel cost of only 6.20 mills/kwh., the slight increase over the preceding year being due to less favorable load factors.

In terms of thermal efficiency, the two Hamilton diesels operated on equally impressive levels. With #4 Miranda crude oil having a heating value of 19,007 Btu. per lb., or 145,403 Btu./gal., the two engines have been delivering power at an average of 9,445 Btu./kwh. since going on the line.

This represents a consumption of 1,228,050 gal. of fuel in generating a total of 18,904,000 kwh. through February, 1954. In 1952, when the first Hamilton engine was operating alone at an average of 15.82 kwh./gal., its efficiency rating was 9,191 Btu./kwh.

Chiefly responsible for these high efficiency ratings, according to Allan B. La Rue, 2nd assistant chief engineer, are the rotary exhaust valves at each cylinder of the engines and the semi-hemispherical design of their combustion chambers. The rotary exhaust valves are driven off the crankshaft through a gear train and are timed to close at the instant the piston reaches the top of the scavenging air port. This traps approximately 40 percent more air in the cylinders, permits higher compression and, again according to Mr. La Rue, gives the effect of supercharging a two-cycle engine. The semi-hemispherical design of the combustion chamber eliminates fuel oil impingement and insures high-velocity mixing of fuel and air. Other important features of the two Hamilton engines include an overhead camshaft, which permits extremely short, high-pressure injection lines; through-bolt design and construction, plus a welded upper base, both of which insure rigidity and vibration-free performance.

Both two-cycle, Model 621SA Baldwin-Lima-Hamilton diesels achieve their rating of 2850 hp. at 250 rpm., and drive 2000 kw., 8000 amp., 250 v., shunt wound, direct-current, General Electric generators. Excitation is provided by individual 10 kw., 40 amps., 250 v., shunt wound, GE exciters, v-belted to the generator shafts. For other installations, these same engineers can operate at 257 rpm., at which speed they are rated at 2900 bhp. (net).

Other major equipment installed in the plant's power house includes four steam turbines driving ac. generators, one Westinghouse and three General Electric; four air compressors, one electric and three steam driven; two rotary converters and one steam driven dc. generator. The four motor-generator sets are located in two sub-stations. Peak load at the plant has been 12,000 kw.

Figure 1. **The No. 1 Hamilton is served by this Ross lube oil cooler and Ross heat exchanger. Mounted on the wall is one of two Bristol recording thermometers which keep an accurate seven-day record of lube and jacket water temperature for both engines.**

Figure 2. **A close-up of the B-L-H rotary exhaust valves, showing its vertical gear-train housing. The valves close at the instant the pistons reach the top edge of the scavenging air ports, trapping 40% more air in the cylinders.**

Figure 3. **At the control end of each Hamilton is a fully equipped Ashcroft gauge panel with Alnor exhaust pyrometer, Weston tachometer, and Ashcroft gauges and alarms on all pertinent pressures and temperatures.**

Figure 4. **The 20-in. by 42-in. Roots-Connersville scavenging air blower with with its 250-hp. GE motor, the Maxim air-intake silencer and exhaust silencer, all serving the No. 2 Hamilton.**

In normal operation one Hamilton diesel engine and one motor-generator set, handle the power requirements at each tank house. The system is completely interchangeable, with this one exception: while both Hamilton diesels can be used to serve the #2 tank house, only one of the engines can serve the #1 tank house. The four motor-generator sets can be switched back and forth at will.

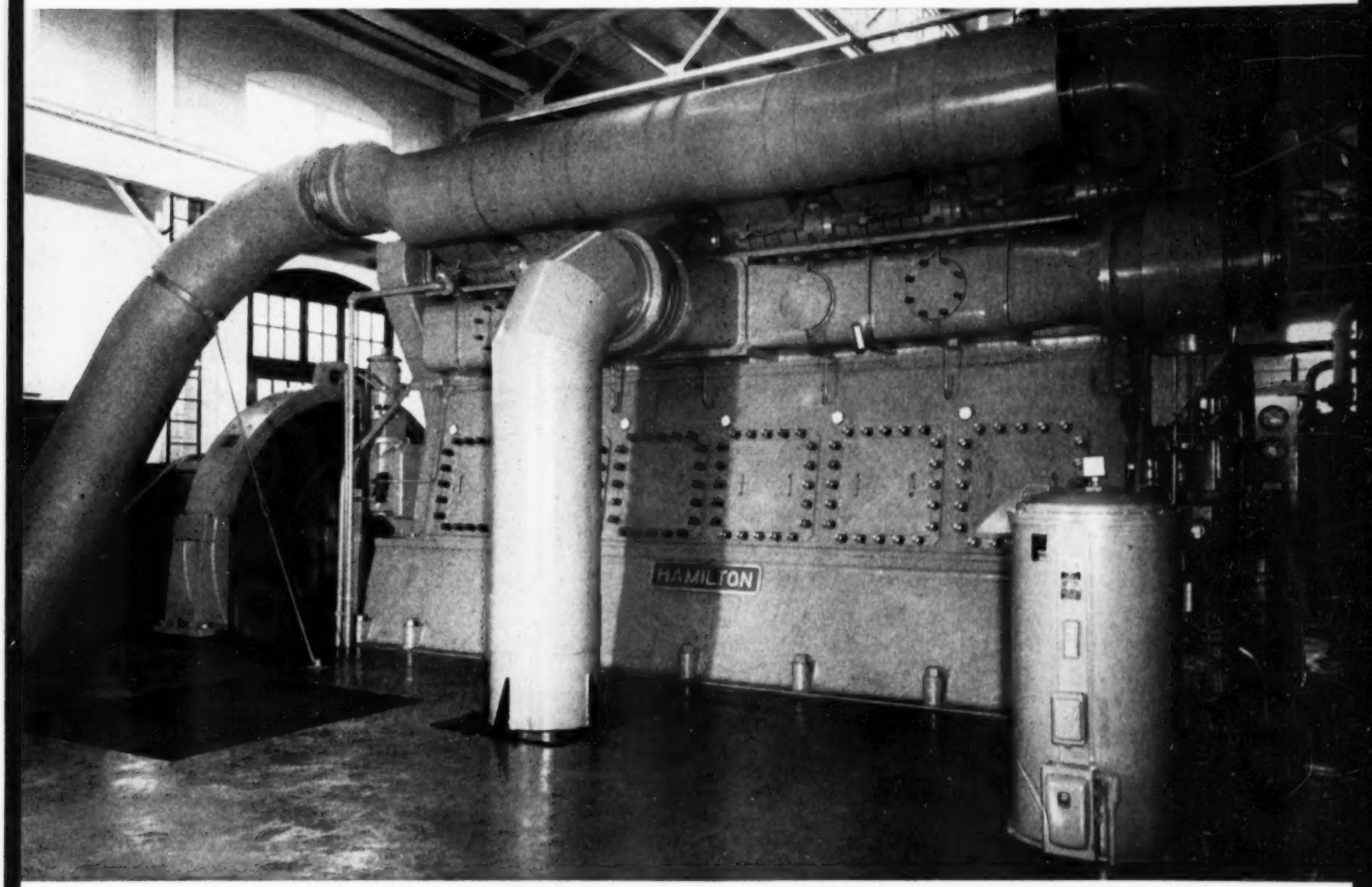
In both Hamilton engines, a #4 Miranda crude oil is used as fuel. Originating from Corpus Christi, Tex., it has a viscosity of .9196 and is delivered at the plant by truck. It is stored in two 15,000-gal. underground tanks and is pumped to a pair of 250-gal. day tanks located high on an interior wall by means of two 1½ in., 1½ hp., float-controlled, motor-driven transfer pumps. Enroute it passes through two recording meters. From each day tank the fuel flows by gravity to a home-made fuel-oil heater, which is supplied with warm jacket water from the engine. From this heater it again flows by gravity to a duplex, full-flow strainer, at which point it is picked up by the engine-driven booster pump and sent to the fuel oil heater through duplex, bag-type filters. When it enters the header, the fuel is under a pressure of 27 psi. From the header, the fuel goes to individual injection pumps at each cylinder and is sent to each nozzle, entering the cylinders when the pistons are just a few degrees from top dead center.

A high-detergent type lube oil is stored at the plant in two 720-gal. storage tanks, located outside the plant. Lube for the six force-feed lubricators on each engine (one six-unit lubricator at each power cylinder) is picked up by an air-driven duplex pump and sent to a 40-gal. overhead supply tank, from which it subsequently flows by means of gravity to the lubricators.

An interesting feature of these lubricators is that, instead of the usual 50-percent glycerin and 50-percent distilled water content, they contain 70-percent distilled water and 30-percent magnesium nitrate, a modification recommended by the engine manufacturer to handle the type lube used. In operation, six drops of lube are forced into each cylinder every sixteen strokes of the piston. Lube for general lubrication and cooling flows by gravity from the two storage tanks into individual sump tanks located in the basement under each engine. A motor-driven pump continuously bypasses lube oil from each sump tank, forcing it through a cartridge-type purifier and then returning it to the sump. Monthly samples of the oil are sent to the plant's own laboratory for analysis, the reports invariably citing its excellent condition.

Salt water from the nearby Raritan River is drawn from a company built channel and is pumped to the plant through a 30 in. force main. It is circulated through the individual lube coolers and jacket-water heat exchangers as a coolant, being dumped back into the river at the end of its circuit. Each heat exchanger and lube cooler is equipped with hand-regulated salt water valves, and the temperature of the lube oil and jacket water is continuously recorded on a seven-day, circular graph. Red lines are used to indicate the lube and blue lines the jacket water temperature.

In starting and shutting-down operations, individual auxiliary lube pumps are used to prime the engines. Each has a capactiy of 340 gpm. and each is driven by a 25 hp., 1770 rpm. motor. Makeup water for the packet-water cooling system on each engine is drawn from the turbines' condensate and is circulated through the cylinder jackets and around the fuel-oil injection nozzles by a 3 in., 10 hp., motor-driven pump. As already stated, the jacket water is cooled in individual heat exchangers. Scavenging air for the two Hamilton



The exhaust side of the No. 2 Hamilton diesel showing its rotary exhaust valves between the air-intake and exhaust manifolds, and its Honan-Crane oil purifier.

The big power house at the Raritan plant. It was once entirely steam-powered. When additional power was required, the two Hamilton diesels were installed, providing plant flexibility, keeping down costs and providing a source of quick, dependable emergency power.

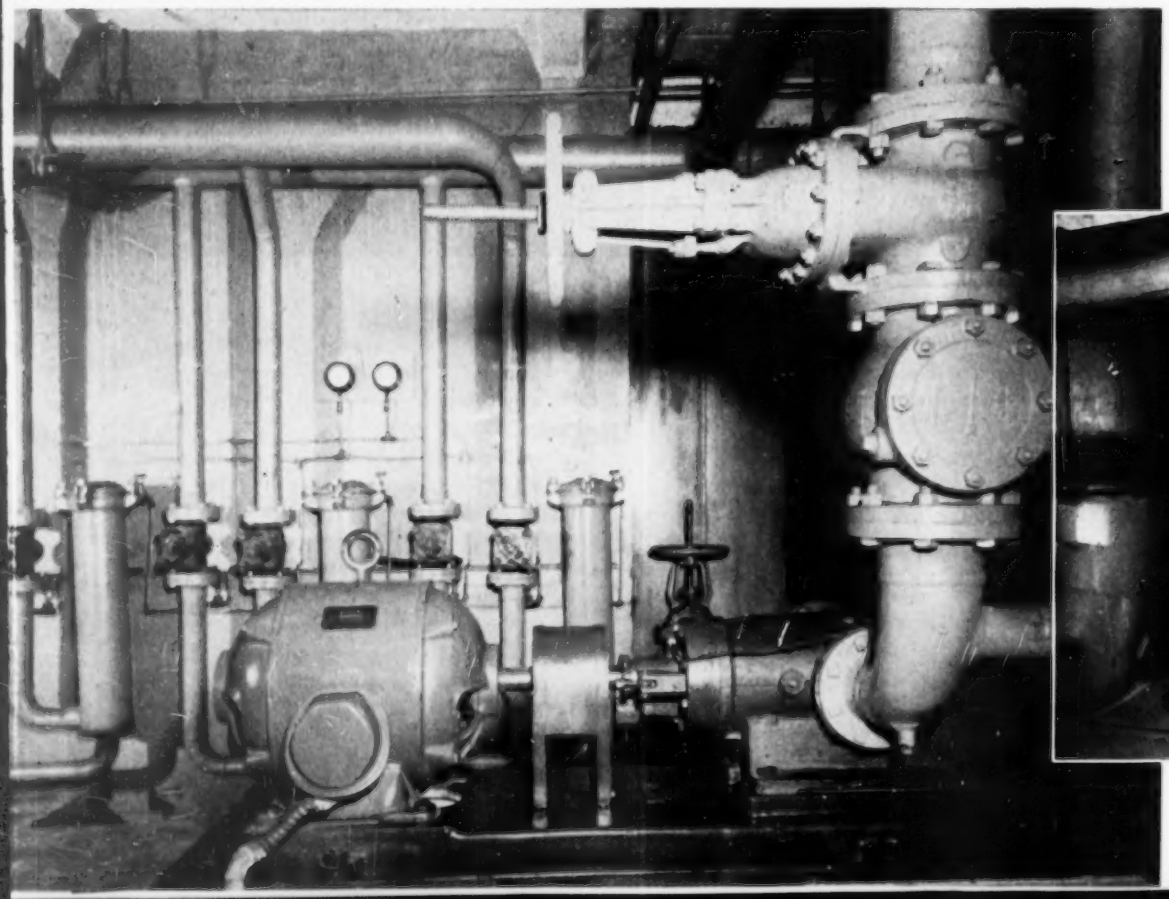
engines is drawn through a pair of oil-bath type filters by two 20 in. by 42 in. motor-driven blowers, being sent to the cylinders at a pressure of 2.5 psi. through individual intake silencers. In the cold winter months, the air is warmed for more efficient combustion by passing it around the two vertical exhaust silencers. The motors driving these rotary, positive-displacement type scavenging air blowers are rated at 250 hp., 585 rmp., and operate on 2300 v., ac. power from the turbines. Starting air for both engines is supplied at 400 psi. by a single v-type, motor-driven air compressor, the motor rated at 5 hp. at 1735 rpm. Compressed air is stored in four large storage bottles in the basement.

In breaking tradition at this once exclusively steam-powered plant, the Anaconda engineers concerned, paid unusually high tribute to the many competitive advantages held by diesel engines over steam turbine equipment. Not only did the engineers achieve their three goals of greater power supply, greater flexibility and lower capital investment, but they gave their plant a dependable source of quick starting, emergency power. By avoiding the complications which would have resulted from installing a high-pressure turbine, they also helped simplify their overall steam operations.

The high efficiency of the two Hamilton diesel engines is especially impressive in the light of these contributions. It is difficult to see how their current fuel consumption rate of 15.39 kwh./gal. could be improved upon. Chiefly responsible for the success of the installation are L. W. Kemp, manager of the International Smelting and Refining Company's Raritan Copper Works; A. E. Palm, chief engineer at the power plant; W. L. Bennett, assistant chief engineer, and A. B. La Rue, 2nd assistant chief engineer.

List of Equipment

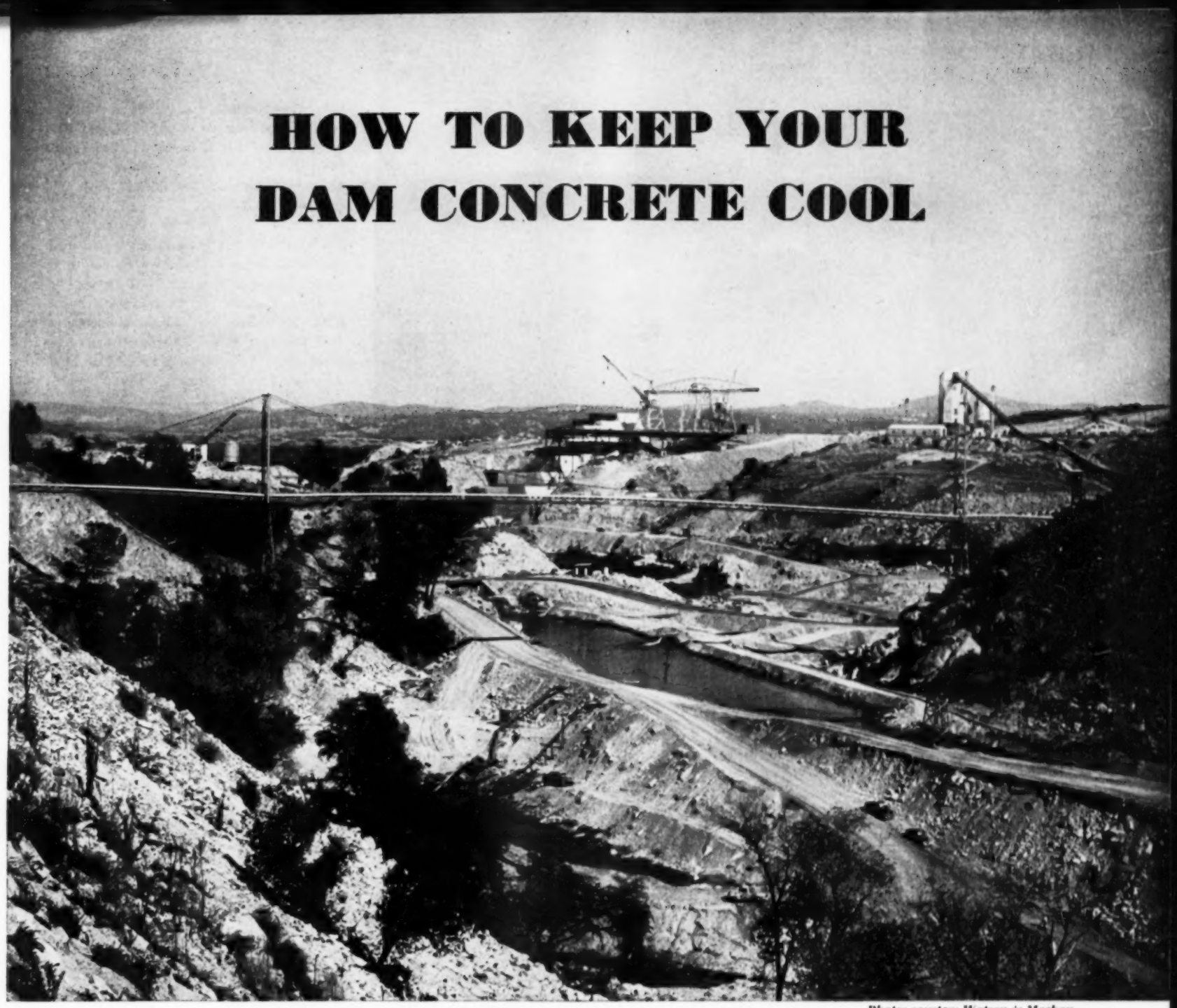
Engines—(2) Model 621SA, two-cycle, six-cylinder, 21½ in. by 27½ in., 2850-hp., 250 rpm., diesel engines, Baldwin-Lima Hamilton.
Generators—(2) Type MCF, 2000-kw., 8000 amps., 250-v., 250 rpm., shunt wound, direct-current generators. General Electric.
Exciters—(2) V-belted, 10-kw., 40-amps., 250-v., shunt wound exciters. General Electric.
Governors—Woodward.
Fuel oil transfer pumps—(2) Blackmer.
Fuel oil booster pumps—(2) Tuthill.
Fuel oil full-flow strainers—(2) Air-Maze.
Fuel oil meters—Buffalo Meter.
Fuel oil duplex filters—Nugent.
Fuel oil injection pumps—American Bosch.
Power cylinder lubricators—Manzel.
Lube full-flow strainers—Nugent.
Lube oil bypass purifiers—Honan-Crane.
Auxiliary lube oil pumps—De Laval.
Lube oil coolers—(1) Kewanee-Ross.
(1) Superior Combustion Industries.
Jacket water pumps—Ingersoll-Rand.
Jacket water heat exchangers—(1) Kewanee-Ross.
(1) Superior Combustion Industries.
Lube & jacket water recording thermometers—Bristol.
Scavenging air blowers—Roots-Connersville.
Air filters—American Air Filter.
Air intake silencers—Maxim.
Exhaust silencers—Maxim.
Air compressor—Ingersoll-Rand.
Exhaust pyrometers—Alnor.
Tachometers—Weston.
Gauges—Ashcroft.
Switchboards—I-T-E.
Fuel oil—#4 Miranda crude oil. Hess Oil Co.
Lube oil—Calso RPM. Delo. California Oil Co.



The 350 gpm. De Laval "Imo" auxiliary pump, shown with its 25 hp. Westinghouse motor. In the rear, are the three Nugent full-flow lube oil strainers serving the No. 2 Hamilton engine.

Installed in the basement are these two American Cycoil oil-bath type air-intake filters. At the left are the exhaust and scavenging air line.

HOW TO KEEP YOUR DAM CONCRETE COOL



Cummins-powered rear-dumps haul gravel over private, high-speed road from sizing plant to conveyor system which bridges American River and climbs to top of batching plant. In background are dam's left abutment blocks and concrete placement trestle and crane.

Photos courtesy Watson & Meehan

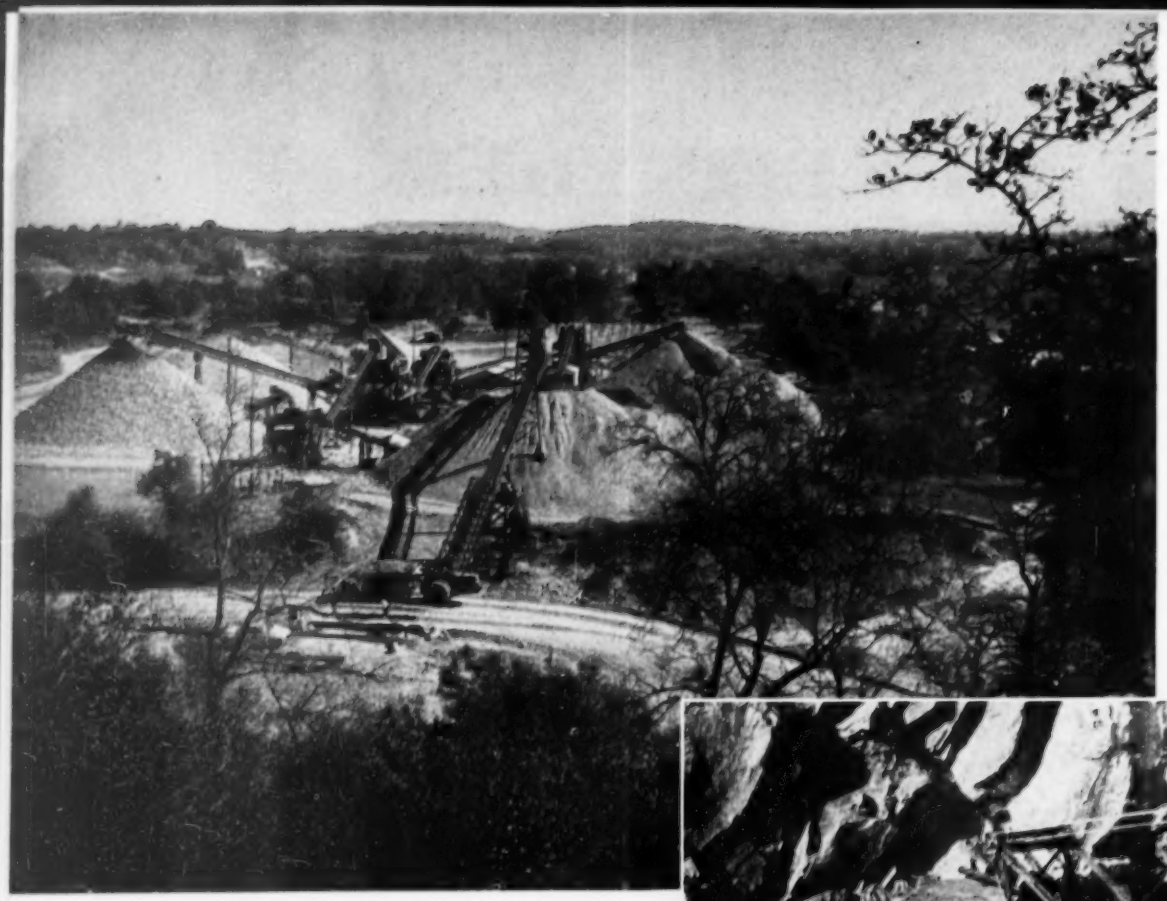
By MARK OGDEN

IN case you're interested in building a 30 million dollar dam, here's the latest method for keeping your concrete cool: use ice in your mix and fan your aggregates. Don't laugh. That's exactly what is being done in the construction of Folsom Dam, 20 miles east of Sacramento, California. If you chill your dam mix, engineers say, your concrete will be as good as new a thousand years hence. However, you'll have to erect a $750,000 refrigeration plant alongside your $250,000 batching plant, as was done at this major Central Valley Project addition.

If you don't want to spend that much money, you'll have to substitute some other scheme for cooling down the concrete poured into the dam. The chemical reaction occurring when water is mixed with cement and aggregates (sand, gravel and cobble) produces heat. Heat is no worry to you when you lay a backyard sidewalk because the heat is dissipated through so much of the concrete coming in contact with the ground and air. But in building a big dam, only a small proportion of the concrete has contact with anything other than more of the same. Therefore, during hydration and hardening of these massive blocks, heat is generated faster than it is dissipated. If the concrete is subjected to high temperatures throughout its hydration period, its strength diminishes so that deterioration and cracks are dangerous possibilities. So, in building your dam, you'll have to take one of the precautions that dam contractors have been taking through the years. Otherwise, something is pretty certain "to give" when a million acre-feet of water puts its backed-up pressure against your structure.

Big dam builders of the recent past solved the heat problem by pouring concrete around a network of pipes through which they could pump ice water during the hardening period. Thus, the heat was dissipated. After hydration was completed, the imbedded coils were pumped full of concrete. If you owned the equivalent of all the pipe that is imbedded in the world's big dams, you certainly would be well able to make a down payment on a three-quarter-million dollar refrigeration plant.

But another step forward was forced by the Corps of Engineers, U. S. Army, in asking for Folsom Dam



Dieselized bottom-dumps haul gravel from river to this plant where it is washed and sized into sand and four grades of gravel.

Diesel was utilized exclusively by H. Earl Parker in completing one of the preliminary excavating jobs.

Dirt moving for embankments was speeded with a Model 10BV Euclid loader. Its 54-inch conveyor belt was driven at 525 feet per minute by a 275 hp. Cummins. Two Allis-Chalmers tractors moved it rapidly and allowed it to load belly-dump trucks at more than 800 cu. yds. per hour.

bids. They specified that the temperature at time of placement must not exceed 50 degrees. Army engineers know that if freshly batched concrete is pre-cooled to that low temperature, all the heat generated by chemical reaction will not be sufficient to weaken the concrete.

To fulfill this new temperature specification, the contractors erected what they believe to be the world's largest cooling plant of its type. (The joint contractors are Merritt, Chapman & Scott, of New York City, and the Savin Construction Company of East Hartford, Conn.) Besides being capable of producing 30,000 pounds of flake ice an hour on a continuous basis, the plant performs several additional chores. Even if chemical reaction did not generate heat in the mix, there would be a problem to cool down the aggregates during the summer months. Aggregates are being dipped out of the American River, two miles below the dam, by a Manitowoc Speedcrane powered by a 550 hp. Cummins diesel. The river gravel is hauled by Euclid and Heil bottom-dump trucks to a sizing plant. There, the gravel is washed, graded into sand and four sizes of rock, and stockpiled until needed at the batching plant. Since summer temperatures in California Central Valley are consistently around 100 degrees, the aggregates absorb enough of the heat to be far above the specified 50 degree temperature limit placed on the concrete of which they become a part.

The aggregates sizing plant is on the right bank of the river while the combination refrigeration-batching plant had to be built on the opposite side. Sand, gravel, and rock, therefore, are hauled by Euclid rear-dump trucks along a high-speed private road to just below the dam site. There the aggregates are dumped onto a Goodrich rubber conveyor belt that bridges the stream and climbs 139 feet to the top of the batching plant. Next, blasts of cold air chill the aggregates in their storage bins. The air, itself, is chilled by being forced through huge cork-insulated coils. Brine, at 18 degrees, is circulated through these coils. Two blowers, each

of 95,000 cubic feet per minute capacity, are utilized in the forced air system.

During the hot summer months, when the heat problem naturally is most acute, thousands of tons of flake ice are used in the mix. The refrigeration plant, however, also includes a water-cooling system. Water passing through it can go either into the ice-making equipment or into the batch, together with, or in place of, ice. In cold weather, ice is not needed, since the water is cooled to less than 35 degrees. All the refrigeration machinery is on ground level, but a tall shaft rises above it which houses the two fan rooms and ice storage space. Dry bulk cement contributes its share of heat to the over-all problem. The temperature of freshly ground cement is around 250 degrees. The Folsom Dam contract, however, specifies that the temperature of the cement when delivered at the batching plant must not exceed 150 degrees. This imposes a pre-cooling problem on the Calaveras Cement Company which is manufacturing and delivering the 900,000 barrels of cement needed for Folsom Dam. Its plant is only 50 miles away, near San Andreas, California. Calaveras worked out methods of cooling its cement toward the end of the production line, thus meeting this latest of precautionary specifications introduced by engineers.

Calaveras cement arrives at the batching plant in dieselized trucks pulling hopper trailers. The trucks empty into a hopper protected from rain by an open-ended shed. A screw conveyor moves the freshly delivered cement to a slender elevator shaft which lifts it to one of two storage silos. Each silo has a capacity of 7,500 barrels. From the silos, screw conveyors automatically feed the cement into the mix as needed. The batching plant was built on the left abutment, a little lower than the crest line of the dam. It can produce 225 cubic yards of concrete per hour. In case there is a delay or break-down in the operation beyond the batching plant, there are storage facilities for three hours' output before the plant needs to be shut down.

While Folsom Dam is not scheduled for completion until January, 1955, works on the various earthen dikes and on the excavation for the main dam and power house began in the spring of 1951. The contract for the main concrete dam was awarded the joint contractors in September, 1951, and preliminary work was started by them that winter. Measured by any standards, Folsom will be one of the nation's major dams. The concrete river section will be 340 feet high and 1100 feet long. Five miles of compacted earth wing dams and dikes will assist in backing up water for a reservoir that, at maximum, will cover 11,500 acres and store 1,000,000 acre-feet of water. Before Folsom Dam, its power house, and its appurtenant works are completed, more than 8,439,000 cubic yards of rock and dirt will have been moved for embankments, and more than 1,030,000 of mass concrete will have been poured. As already has been indicated, deisel engines have played a wide variety of important roles in accomplishing this work.

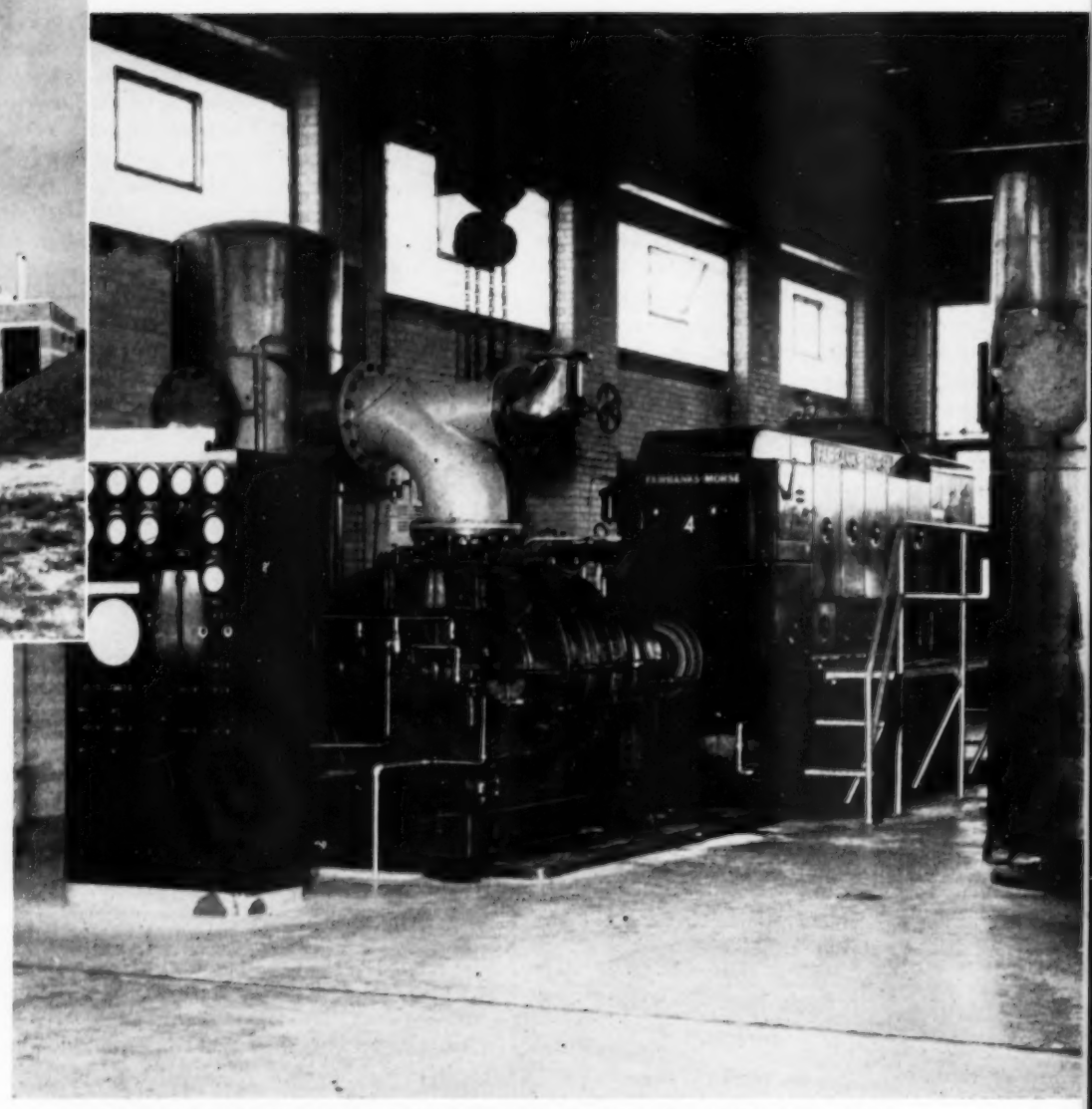
Calaveras Cement Company's Cummins-powered Peterbilt discharging cement into silos. Folsom Dam refrigeration and batching plants in the rear.

Six pieces of Cummins-powered equipment are shown in this picture. All units belong to Guy F. Atkinson & Co., which won two of the largest subcontracts on the Folsom Dam job.

The prime contractors have used dieselized equipment almost exclusively in their heavy earth and materials moving work. When activity was at its summer peak in 1953, more than 50 Cummins-powered earth movers, draglines, shovels, pumps and transport trucks were being used by the Savin Construction Company, Guy F. Atkinson Company, South San Francisco, California who did the difficult excavation through rock for the 7000-foot tailrace channel and who now is engaged in fulfilling another cotnract for building the power house itself have used a Model 88-B Bucyrus-Erie shovel with a Model L Cummins and 14 Euclid rear-dumps with 300 hp. Cummins engines. Other subcontractors who have been on the Folsom Dam job with Cummins-powered equipment include T. E. Connolly, Inc., of Stockton, California; John Delphia, Patterson, California; H. Earl Parker, Inc., Marysville, California; and Morrison-Knudsen Company, Inc., San Francisco, California.

Although the dam is being built under the jurisdiction of the Army Corps of Engineers, the U. S. Bureau of Reclamation is supervising; and will manage the building of the power plant and subsequent irrigation systems. Folsom Dam will add 175,000 kw. to the power potential of the Central Valley Project, and provide for irrigating 200,000 additional acres of farmland. Besides providing power and storage for irrigation water, Folsom Dam, like other CVP dams, will control floods and make new recreational areas available to sportsmen.

This modern building houses the five blowers that provide air for the expanded sewage treatment plant at Lansing, Michigan. Capacity is now 27,000 cfm.



To provide air for Lansing's expanded treatment plant, the city installed these two Model 31AD8½, 325 hp., Fairbanks-Morse dual-fuel engines, each driving a 7,000 cfm. Roots-Connersville blower. The power units saved an estimated $30,000 in a single year of operation. To the right of each blower are the Burgess-Manning snubbers.

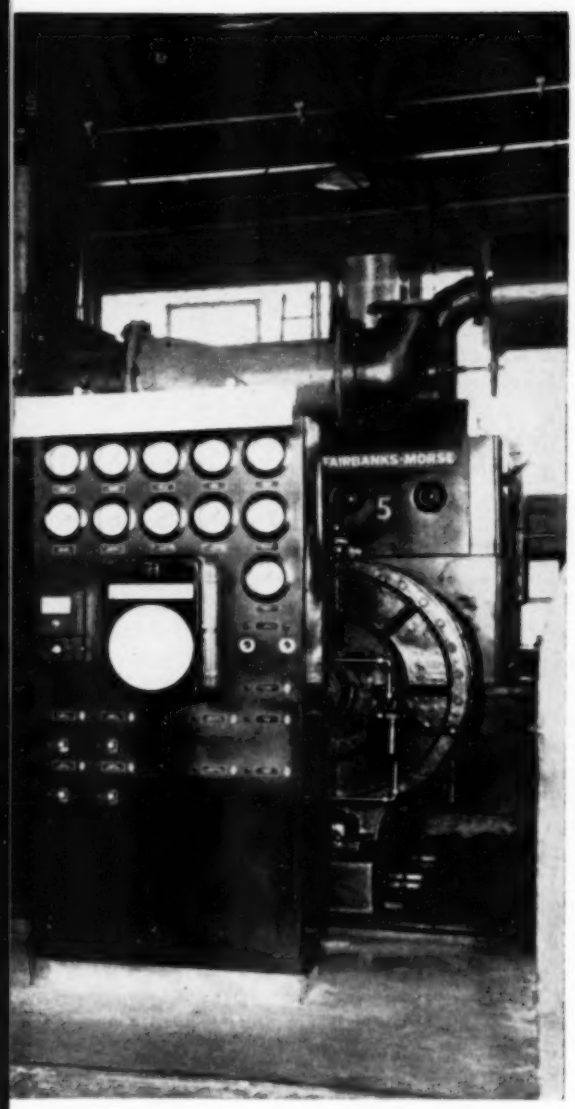
SEWAGE GAS ENGINES SAVE LANSING $30,000

By DOUGLAS SHEARING

INSTALLATION of two 325 horsepower Fairbanks-Morse dual-fuel sewage gas engines has given Lansing, Michigan's newly expanded sewage treatment plant a highly flexible, dependable and economical power supply. In their first year of operation, the new engines saved the plant $30,000 compared with the rate for an equivalent volume of purchased power. This plant is of interest on several counts: the efficient performance of two-cycle engines on sewage gas fuel, the advantageous use of dual-fuel engines to assure continuity of operation, the high efficiencies achieved through use of engine waste heat and, finally, the important cash savings resulting from the use of gas-burning dual-fuel power plants.

The original Lansing sewage treatment plant was constructed in 1938 when population was close to 70,000 and the plant was designed for normal flow of 9 million gallons of sewage per day with provision for a maximum flow of 18 mgd. Complete treatment was provided including pre-aeriation primary settling, seration, sludge digestion, and garbage grinders which discharged into the digesters. Air for aeration was supplied by three Roots blowers, a 5,000 cfm. unit driven by a 240-hp. spark-ignition Worthington sewage gas engine, and two 4,000 cfm. blowers driven by 200-hp. electric motors. By 1945, population was up to 82,000 and normal flow was up to 12 mgd., a serious overload on the 9 mgd. facilities. It was decided to enlarge the plant to give it capacity to serve a design population of 117,000, with an average flow of 20 mgd., partial primary treatment for 40 mgd. and secondary treatment for a 30 mgd. maximum. The pumping station was enlarged to 40 mgd. capacity and equipped with mechanically raked screens and grinders, eleminating need for screens at the plant. Sewage now enters the plant to a Dorr detritor for grit removal, then goes to the pre-aeration tanks for 10 minutes and on to the sixteen 16 ft. by 87 ft. primary tanks for detention of 2 hours at design flow and one hour at maximum flow. Sludge is pumped to the ten digesters (four original Dorr and six new fixed cover tanks) with total capacity of 1,382,000 cu. ft.

Settled sewage from the primary tank goes to secondary treatment through an overflow structure. The settled sewage first goes to a small air-agitated tank for mixing with return sludge and the mixed liquor then flows through aerated channels to six aeration tanks, the original four and two new tanks, each with two passes 30 ft. wide. Air is diffused in the tanks by means of Chicago Precision tubes and swing diffusers. After aeration, the mixed liquor flows to six 80 ft. diameter final settling tanks, 2 original tanks with Hardinge clarifiers and 4 new tanks with Dorr clarifiers. Effluent finally passes through a chlorine contact tank. The sludge handling system includes elutriation tanks, vacuum filters, and dryers. The enlarged garbage handling facilities include storage wells in which ground garbage is agitated by air diffusion to cause grit to settle out so that grit-free garbage can be dumped to the digesters. This is a bare outline of equipment and procedures at the new



Expanded Sewage Treatment Plant Utilizes Two 325-Hp. Fairbanks-Morse Units to Drive 7000 CFM Roots Blowers

Lansing plant, but our primary concern here is the means taken to power the blowers that supply the large volume of air needed in primary and secondary treatment and in garbage handling. The consulting engineers, Drury, McNamee, and Porter, of Ann Arbor, Mich., decided that there should be an air supply of 1 cu. ft. per gal. of sewage at 30 mgd. maximum flow, which requires blower capacity of 21,000 cfm. To allow for peak demands and for standby, it was decided to install two new 7,000 cfm. blowers, bringing total available air supply to 27, cfm.

To drive these blowers, the city chose two identical Fairbanks-Morse two-cycle dual-fuel diesels, each rated at 325 hp. at 514 rpm. Normally, these engines use sewage digester gas as fuel with a small quantity of diesel fuel oil injected to initiate combustion in the cylinder. If desired, however, the engines can run wholly on oil. Each unit drives directly a 7,000 cfm. Roots-Connersville rotary positive blower. In a plant which already had one blower powered by a spark-ignition engine running entirely on sewage gas and two blowers driven by motors for which electric power was purchased, it is interesting to note the factors which dictated the choice of dual-fuel engines for the new installation. Sewage gas, product of sludge digestion, obviously is the cheapest fuel and its use provides the most economical source of power, but the supply of gas is limited. At Lansing, the gas supply approximates 3 cu. ft. per capita per day, triple the average, and this large supply is attributable to the addition of garbage to the digesters. But demands for the gas are equally high for it is used not only as engine fuel but for sludge heating and drying, building heat, and water heating for garbage can washing. (Lansing picks up garbage, can and all, leaving a clean can.)

The two F-M engines went into service in May, 1952, and in the fiscal year ending April 30, 1953, justified the calculations and expectations. The two dual-fuel units, running alternately, were in operation a combined total of 8,450 engine hours and compressed 3,137,000,000 cu. ft. of free air to an average pressure of 8 psi. Total fuel consumed was 24,654,000 cu. ft. of sewage gas and 20,243 gal. of fuel oil. The gas, of course, cost nothing. Since no men were added to the plant's operating staff and the engines run normally without attendance, the city does not assess any labor cost against the engines. The only costs figured are the following:

Fuel oil (20,243 gal @ 11.3¢)	$2,287.46
Lube oil (508 gal. @ 66¢)	335.28
Maintenance & repair	295.76
Total operating cost	$2,918.50

To compress the same volume of air with motor-driven compressors would take an estimated 1,770,000 kwh. of purchased power which the plant gets at 1.87 cents a kwh., a total of $33,099.00. Thus the operation of the dual-fuel engines meant a saving of more than $30,000.00 in a single year.

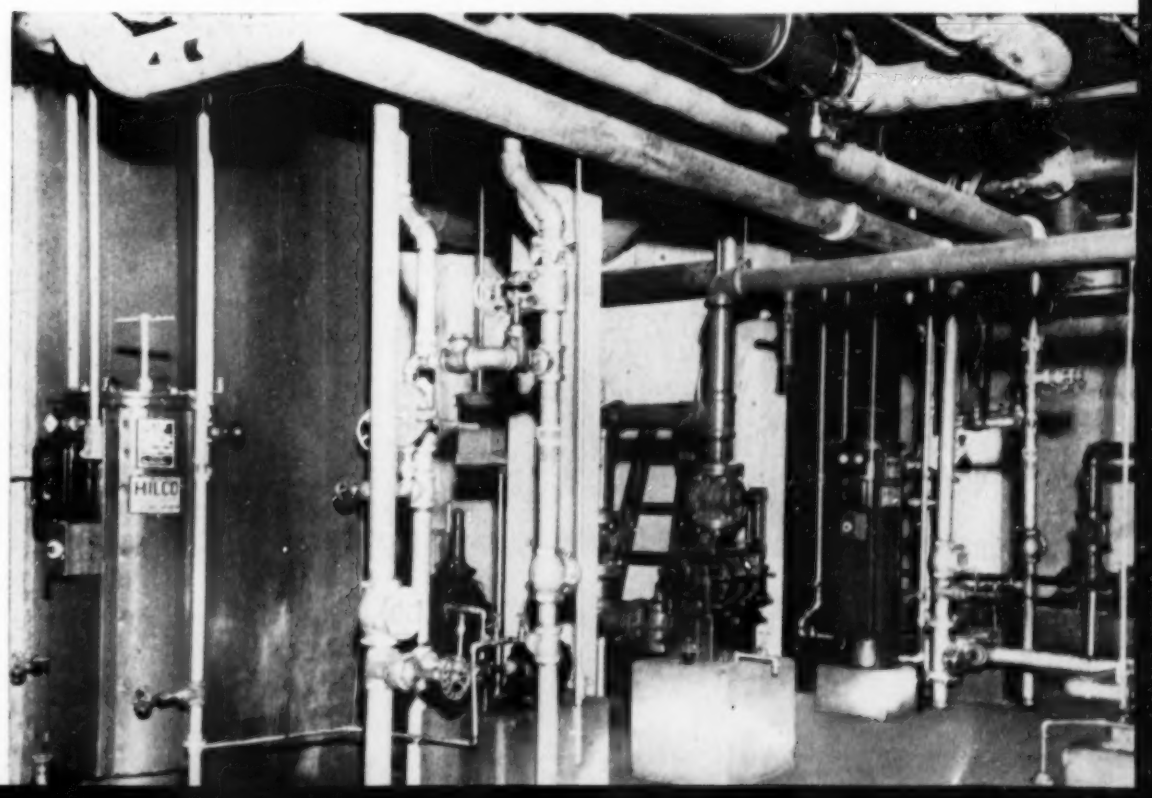
Engines pay for themselves quickly at that rate. In terms of cost per thousand cu. ft. of air compressed, the dual-fuel engines averaged 0.93 mills per mcf., less than a tenth of the 10.5 mills per mcf. that purchased power cost. In the course of the year there were about 50 occasions when the supply of sewage gas was insufficient to run both the spark-ignition engine (which must have gas to operate) and one of the dual-fuel units. On each of these occasions, a dual-fuel engine was run as a straight oil-burning diesel for about 10 hours.

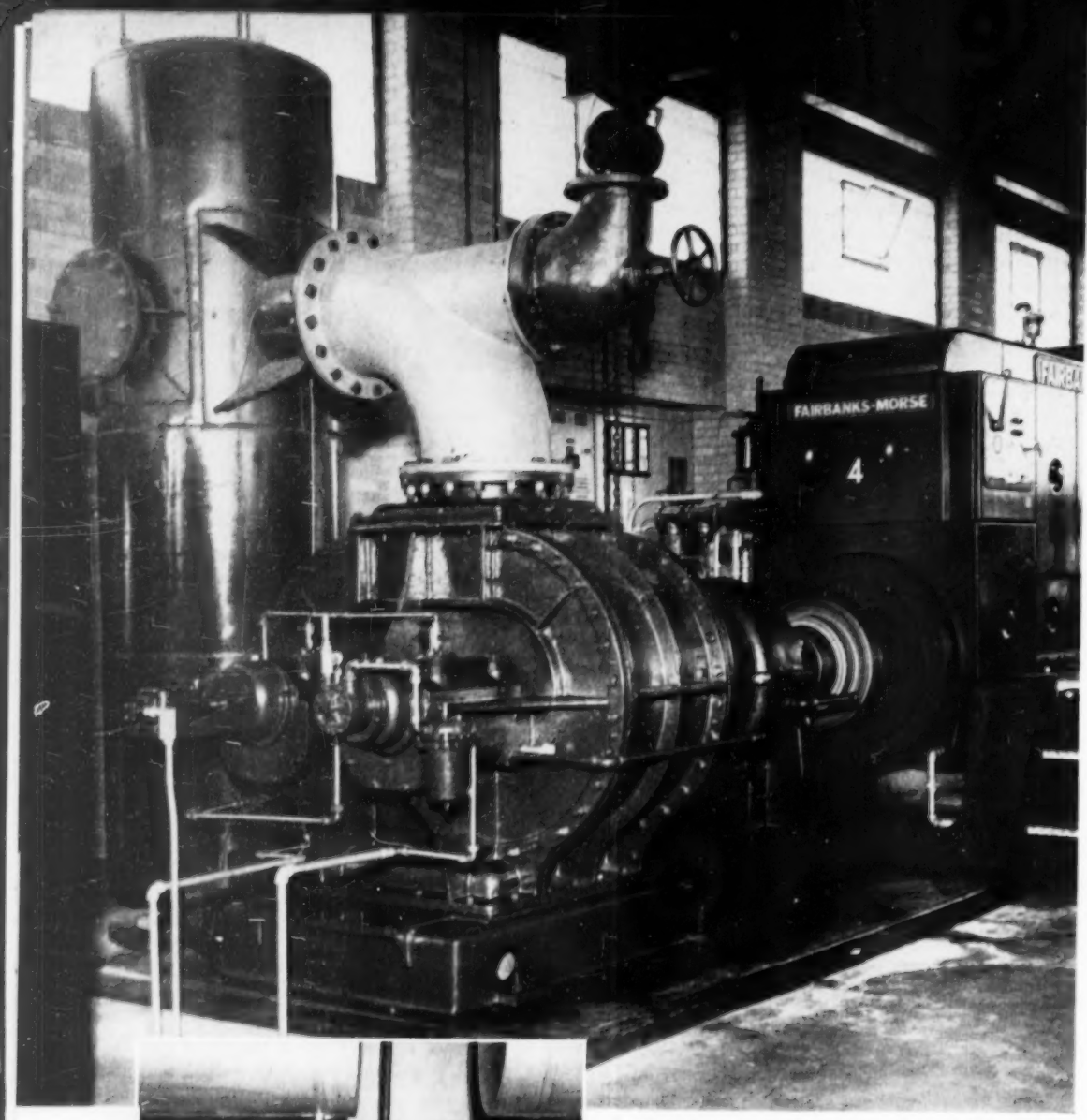
This not only demonstrated the continuity of service assured by dual-fuel engines but also evidenced the economy of diesel operation. On full oil operation, the diesels produced a thousand cu. ft. of air for a fuel, lube and maintenance cost of 4.5 compared to 10.5 mills for bought power.

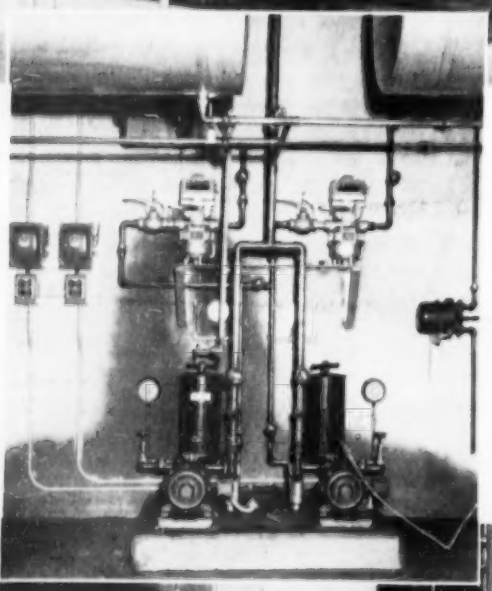
On dual-fuel operation, the efficient high-compression diesels consume only 2.35 cu. ft. of sewage gas (with a lower heating value of about 550 Btu. per cu. ft.) and 0.0044 gal. of pilot oil per mcf. of air compressed. This amounts to a total fuel input of about 5,178 Btu. (LHV) per mcf. of air. On the same basis, the older, lower-compression, spark-ignition engine requires 7,189 Btu. per mcf. of air.

Lansing has noted an advantage in the use of two-cycle engines for operation on sewage gas. The gas contains some corrosive sulphur and the two-cycle engine has no exhaust valves to corrode. This is reflected in the low maintenance costs reported above and also in the unusually high availability of the two F-M engines. In the 20-month period from installation in May 1952 through December 1953, the two dual-fuel units were available for service a combined total of 28,902 engine-hours out of a possible 29,280, an impressive 98.7 percent of the

Auxiliary equipment serving the F-M engines includes Hilco lube filters, Ross oil coolers (overhead) and Roots-Connersville gas meters.



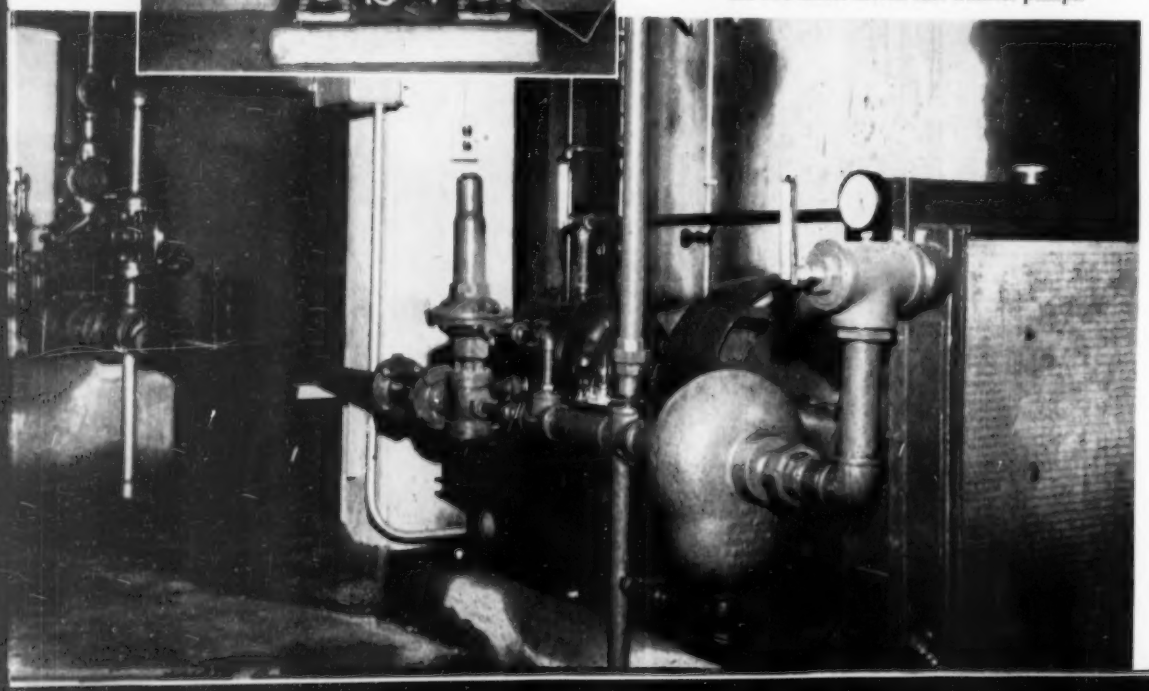




This close-up view shows one of the two 325 hp. Fairbanks-Morse engines and the 7,000 cfm. Roots-Connersville blower it drives. The engine normally operates on sewage gas with a small amount of diesel oil as pilot fuel but can operate wholly on oil when necessary. At left is the Burgess-Manning snubber through which the blower discharges air. Heat recovery silencers are Maxim.

Fuel gas for one of the two-cycle Fairbanks-Morse engines is compressed by this Allis-Chalmers rotary compressor driven by a 20 hp. F-M motor. Gas reaches the engines at 28 lbs. At left is a Roots-Connersville rotary positive gas meter.

Pilot fuel for the two F-M dual-fuel diesels is stored in a pair of elevated day tanks in the plant basement. Also shown are the Bowser fuel meters and filters and the two motor-driven fuel transfer pumps.



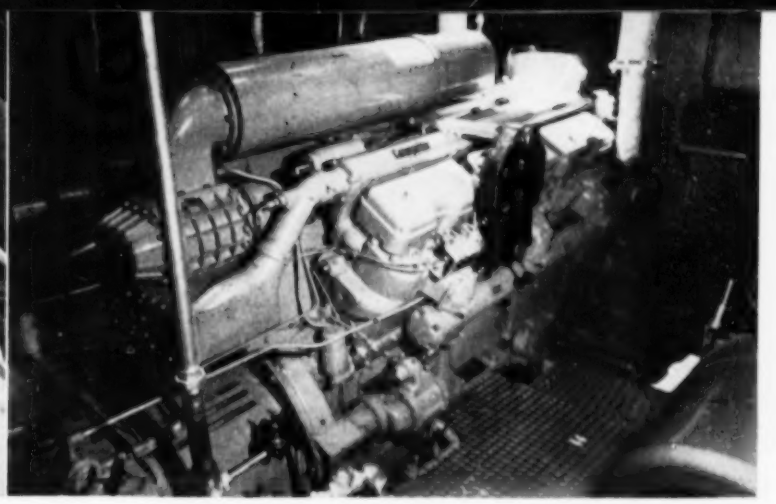
time. One engine was ready for work 14,316 hours out of a possible 14,640 or 97.7 percent. The other F-M engine was down for maintenance only 54 hours in 14,640 and was available for service 99.6 percent of the time.

Two-cycle engines (like supercharged four-cycle units) require a gas supply at higher pressure than is afforded by the gasometer and so the F-M engines are served by a motor-driven rotary gas compressor which provides fuel for the dual-fuel engines at 28 psi. In the last fiscal year, total gas production was 103,170,000 cu. ft., of which 24,654 mcf. went to the Fairbanks-Morse engines, 23,226 mcf. to the Worthington engines, about 9,850 mcf. for building heating, about 9,360 mcf. for water heating, and the rest for sludge heating and drying. Lubricating oil consumption for the new engines has been low. In the full year under discussion, the two engines consumed a combined total of 508 gal. of lube in 8,450 engine-hours of operation, an average of 7,069 rated hp. hrs. per gal. of lube. The thermal efficiency of a sewage gas engine is greatly enhanced by the utilization of waste heat for sludge heating and at Lansing a high proportion of the heat rejected by the engines is recovered for this purpose. Heat recovery guaranteed by the engine builder included 21.6 percent in the engine jackets and manifold and 25.7 percent in the exhaust gas heat recovery silencers.

Jacket water is circulated through each of the dual-fuel engines by an engine-driven centrifugal pump, entering the engine at 148°F. and leaving at 158°F. The water then passes through a Maxim heat recovery silencer where temperature is raised to 161°F., some returning to the engine through a blending line and automatic thermostatic valve. The rest of the hot water goes to the section of three motor-driven pumps which send it through the three sludge heat exchangers from which it exits at 130°F. Returning from the sludge heat exchangers, the water picks up 4° in the Ross lube coolers that serve the engines and blowers, then is blended with hot water from the blending line and reaches the jacket water pump at the engine at 148°F. There is a Ross heat exchanger in the return line between the sludge exchangers and the lube coolers to cool the water further if necessary, but except in the hot summer months, the sludge absorbs all the heat the engines can provide. The jacket water flows through the Ross heat exchanger but no raw water is pumped through to cool it, a not inconsiderable saving in pumping costs. In hot weather, if jacket water temperature rises, a motor-driven pump is started and circulates raw water (plant effluent) through the exchanger, the flow being divided between the heat exchanger and waste by a thermostatic valve.

Lansing's efficient, modern equipment is operated under the supervision of George Wylie, Superintendent of Treatment Plants. Collins Thornton is the city's Director of Public Service. Mayor Ralph Orego, in office since 1943, has been influential in the development of the enlarged treatment facilities. Today, Lansing has a population of 95,000 and average sewage flow is 16.5 mgd. The city still has a comfortable margin of treatment plant capacity and, to supply power for aeration, sewage gas engines that combine economy, flexibility and great dependability.

Mrs. J. Culbert Palmer, sponsor, christens the new *Sandy Hook*.



The Caterpillar diesel which powers the *Sandy Hook*. It is a Model D397 500 hp. marine engine.

THE NEW "SANDY HOOK"

FOR fifty years, the New York and New Jersey United Sandy Hook Pilots Association had been unable to construct a pilot boat according to their own specifications. Once in the late '30s, the Association had bids out, but the Pilot Boat *Sandy Hook* was sunk and it was necessary to replace it immediately by purchasing a yacht. In 1948, the pilots tried again, but the government said there was no assurance that sufficient steel would be available. In July, however, the new Pilot Boat *Sandy Hook* was commissioned and took the station off Sandy Hook as other pilot boats have done since 1691. It was in that year the Colony of New York "ordained there shall be four men appointed and commissioned who shall constantly attend at some convenient place near the Hook with a boat to give aid and assistance to vessels."

The new *Sandy Hook* was constructed according to specifications of the Association which is composed of 120 pilots in New York and New Jersey. Essential dimensions are: length—90 ft. 4 in., beam —18 ft. 11 in.; depth amidship—10 ft.; loaded draft —7 ft. 10 in. More than that, however, the *Sandy Hook*, which cost approximately $200,000, is light weight for speed—12 knots is anticipated—and sufficiently sturdy to remain "on station" in the most abusive weather even when other boats seek the harbor's shelter. Fashioned after the Down East and Nova Scotia trawlers by Designer Walter McGinnis, the *Sandy Hook* must also be extremely maneuverable for boarding procedures. Power is from a Caterpillar diesel D397 500-horsepower marine engine which was selected. The engine was supplied by H. O. Penn Machinery Co., Inc.

With these qualities, the Pilot Boat *Sandy Hook* is an impressive addition to the fleet of three pilot boats, one of which she replaces, and five seagoing motor launches. The fleet includes the *New York*, 1897, and the *New Jersey*, 1902, both constructed by the Association just before the two rival pilot associations were consolidated in 1905. The third vessel is the *Wanderer*, an old Gloucester fisherman, purchased from Charles F. Kettering after the original *Sandy Hook* went down in 1939. Formerly R. A. C. Smith's yacht *Privateer*, the *Sandy Hook* was rammed and sunk by the Norwegian freighter, *Oslo Fjord*, near Ambrose Light April 27, 1939.

Predecessors of the *Sandy Hook* have cruised as much as 600 to 700 miles off The Light in the interest of shipping. During a 100-year period, 64 pilot boats and the lives of 165 men were lost in the hazardous duty. During the War of 1812, one boat was dispatched to Sweden to warn vessels of approaching hostilities. The Pilot Boat *Traver* captured 12 British brigs and schooners, recaptured the full-rigged *Margaret* with full cargo. It was an impressive and colorful ceremony there on March 16, 1953, when the Pilot Boat *Sandy Hook* was launched at the Brigham Shipyard, Greenport, L.I.

Among those present were: Capt. Hilton Lowe, president of the New York and New Jersey United Sandy Hook Pilots Benevolent Association, which will actually own the *Sandy Hook;* Capt. D. V. Jones, president of the New York branch of the Association; Theodore Brigham, the builder; Walter J. McGinnis, designer; Admiral Louis V. Olson, commandant, Third Naval District, U. S. Coast Guard; J. Culbert Palmer, who, like his father before him, is attorney for the Association; Mrs. Palmer, the *Sandy Hook's* sponsor; and others.

Photos courtesy Watson & Meehan

SAN FRANCISCO FIREBOAT

SAN Francisco now can be added to the list of American ports that have supplanted steam fireboats with modern diesel vessels. Fire protection for San Francisco's waterfront was transferred May 1 from two 45-year-old steamers to the new *Phoenix*, powered by three 550 hp. and two 110 hp. Cummins diesels. After the earthquake and fire of 1906 had devastated San Francisco, city officials ordered the *David Scannell* and *Dennis T. Sullivan* built. Both vessels went into service in 1909. They have served the city well. However, in speed, maneuverability, and general fire-fighting ability, the veterans are out-dated, and are past retirement age.

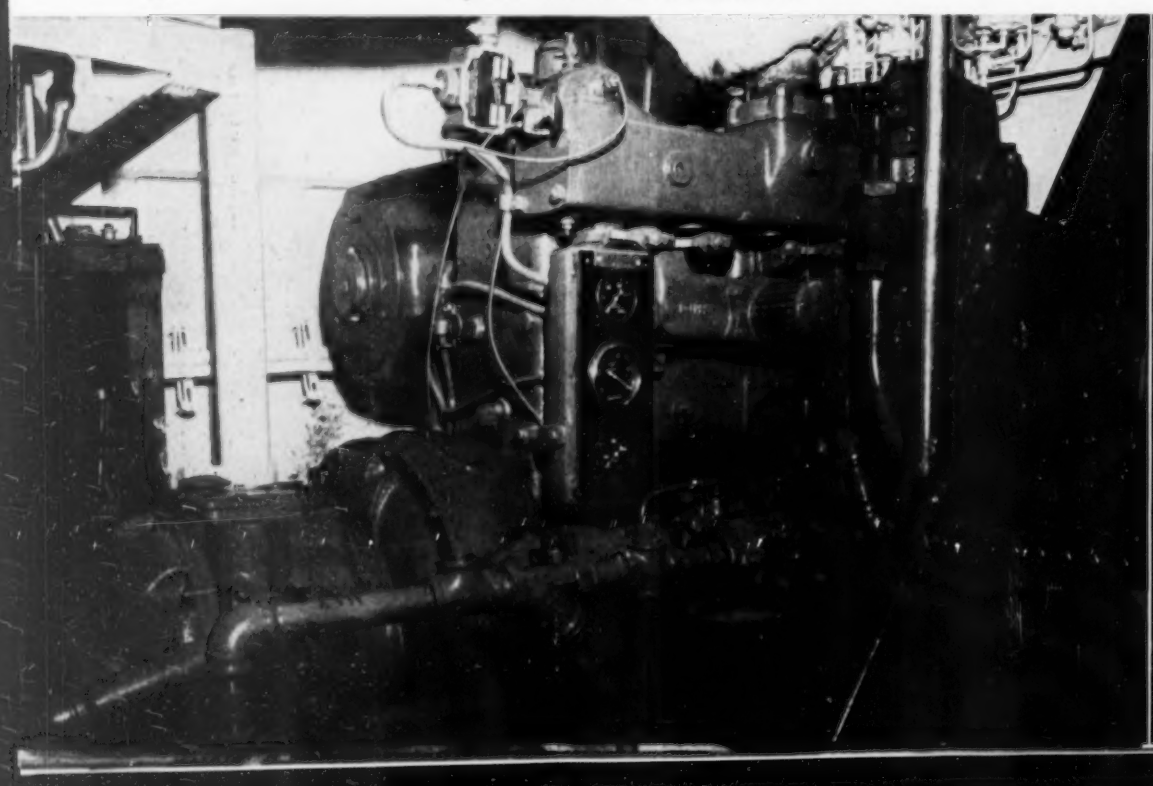
During the long lives of the *Scannell* and *Sullivan*, financial responsibility for San Francisco's waterfront fire protection gradually shifted from city to state. The flames of a running controversy were fed by debates as to who should pay which bills. As costs mounted, the heat of the conflicting views grew. At times it seemed that spontaneous combustion might cause a blaze that would test the extinguishing capacity of even an Alden-designed, diesel fireboat. Finally, the California Board of State Harbor Commissioners was informed by the city administration that the city would pick up no more fireboat tabs. This was disconcerting enough, but in addition, a little investigation convinced the Commissioners that the tabs were unduly high. Buying fuel and paying men to maintain a constant boiler pressure of 175 pounds in two aging fireboats was deemed to be a luxury the Commission couldn't afford. Consequently, the Commission made a nation-wide study of fireboats and of fireboat operating costs. As a result of its findings, John G. Alden, Boston naval architect, was engaged to design a vessel around high-speed, lightweight Cummins diesel engines. As will be explained later, pioneering work done in 1930 by John G. Alden started him on the road to recognition as an outstanding specialist in fireboat design. For San Francisco, he created a boat of 126 tons displacement that is conspicuously modern and surprisingly compact. It is fast, highly maneuverable, and packs a terrific fire-fighting punch.

The Board of Commissioners asked for construction bids on Alden's design, and awarded a contract to the Plant Shipyard Corporation, Alameda, California. Its bid was $392,000.00. The five Cummins diesels, complete with reduction gears, pressure gauges, priming pumps and instrument panels (specifically designed for maximum visibility) were delivered to the shipyard in November, 1953, by Watson & Meehan, Northern California Cummins distributors.

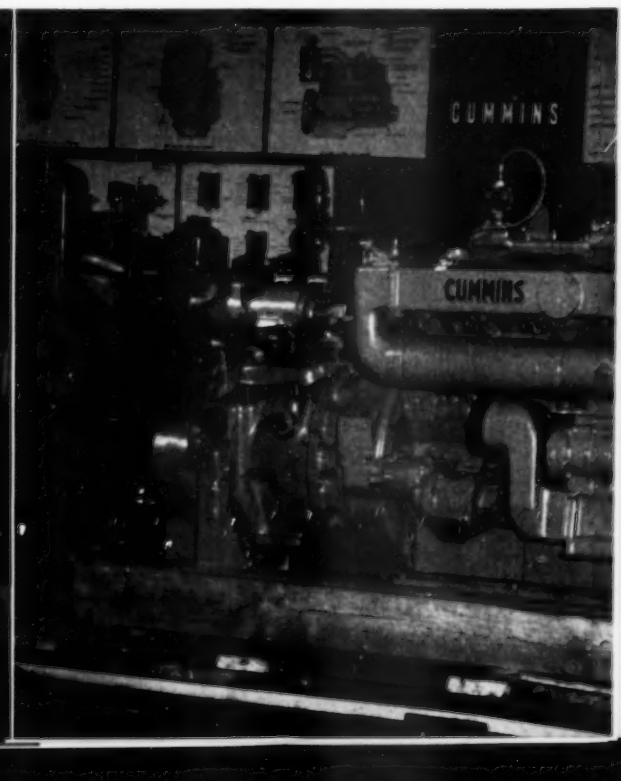
Phoenix was chosen as the name for the new San Francisco fireboat as a result of a public contest sponsored by the Harbor Commission. According to Egyptian folk lore, the Phoenix was a miraculous bird which lived for 500 years, to be consumed in fire by his own act, and then to rise in youthful freshness from its own ashes. The vessel was launched with appropriate ceremonies February 1, 1954. In March, the *Phoenix* began passing a series of rigid tests prior to being accepted by the State Harbor Commission.

Enthusiasm for the performance of the boat and her engines is expressed by the two men most concerned at this stage. They are Hugh Monroe, naval architect for Plant Shipyard, and Harold A. Samuels, superintendent of tugs and dredges for the State Harbor Commission. Mr. Munroe has been with the vessel daily since her keel was laid. Mr.

Maneuvering engines are tucked away in after corners of engine room. They are 110 hp. 4-cylinder Cummins diesels with 3-to-1 Snow-Nabstedt reverse reduction gears. Both can be connected to the propeller shafts via Link-Belt chain drives, and to 7½ kw. Imperial generators. Starboard engine is shown. Generator is barely visible. Fulton-Sylphon regulator top left. Leece-Neville air starter center bottom.



One of the 550 hp., 12-cylinder propulsion-pumping engines leaving Watson & Meehan's San Francisco shop after accessories were installed. Snow-Nabstedt 2-to-1 reverse reduction gear



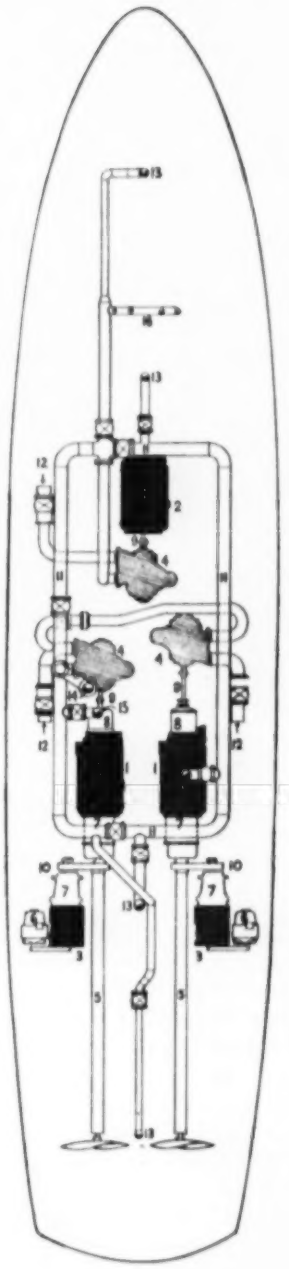
Samuels is the man responsible for operation and maintenance of the *Phoenix*.

The length of the *Phoenix* is 88 feet 8½ inches, over all, and 85 feet at the water line. Her beam overguard is 19 feet 4 inches, designed draft 5 feet 11 inches. Maximum speed 15.4 miles per hour. Under tests in the Bay, the *Phoenix* made 7.9 miles per hour under power of the two maneuvering engines, turning at only 1200 rpms. to produce 70 hp. each. The five Cummins diesels can be fully controlled from either the pilot house or the engine room. This air-actuated control includes starting, speed for propulsion and pumping, and ability to switch engines from propulsion to pumping and back. Such punch button features, plus the use of the five lightweight diesels, gives San Francisco increased fire protection at reduced operating costs.

The *Phoenix* was built of all welded steel, to American Bureau of Shipping standards. The hull and deck are longitudinally framed, whereas the bottom is formed by a grid of longitudinal and transverse members. As on all recent Alden-designed fireboats, large crossover seachests are included to provide an adequate volume of sea water for the fire pump suction. Twin skegs, and twin rudders give improved water flow to the propellers. The two propellers are driven by V-type, 12-cylinder, Model NVHMS-1200 Cummins diesels. The Columbian propellers are 40 inches in diameter with 20-inch pitch. The main engines can be cut from the propulsion shaft and switched to pumping. A third 550 hp. Cummins engine, located forward, is for pumping only. The main propulsion engines are connected to the shafts through Snow-Nabstedt 2-to-1 reverse reduction gears. Full front power take-offs and flexible couplings connect the main engines to the DeLaval fire pumps. The third 550 hp. Cummins diesel is coupled directly to the forward fire pump.

When the three Model 2KS-10 eight-inch DeLaval pumps are throwing water, the vessel has a capacity of 9,600 gallons of water per minute at 150 psi. Thrust from these streams of water are powerful enough to move the boat through the water away from the blaze being fought. To counteract this, the fireboat has two additional Cummins diesels. These maneuvering engines are 4-cylinder, 110 hp. model HRM-400 Cummins diesels. They are cut into the propulsion trains through Snow-Nabstedt 3-to-1 gears by means of Link-Belt chain drives. They also are used to power belted variable speed 7½ kw. Imperial generators. The boat is piped to handle the three modern methods of fighting fires: by water, areo-foam, and CO_2. The three DeLaval pumps are each of 3,200 gpm. capacity. They are two-stage, centrifugal pumps. Eight-inch risers reach the 10-in. main loop from which water is taken by 4 deck monitors and a deck manifold, amidships. The monitor on the pilot house has a capacity of 3000 gpm. Each of the other three monitors—on the forecastle, the elevating tower, and the stern—has a capacity of 2000 gpm. The after monitor is portable so that a cable can be led to a towing bollard. The amidships manifold has ten 3-inch, multi-direction hose outlets, while four additional 3-inch hose outlets are fitted in the forward end of the deck house.

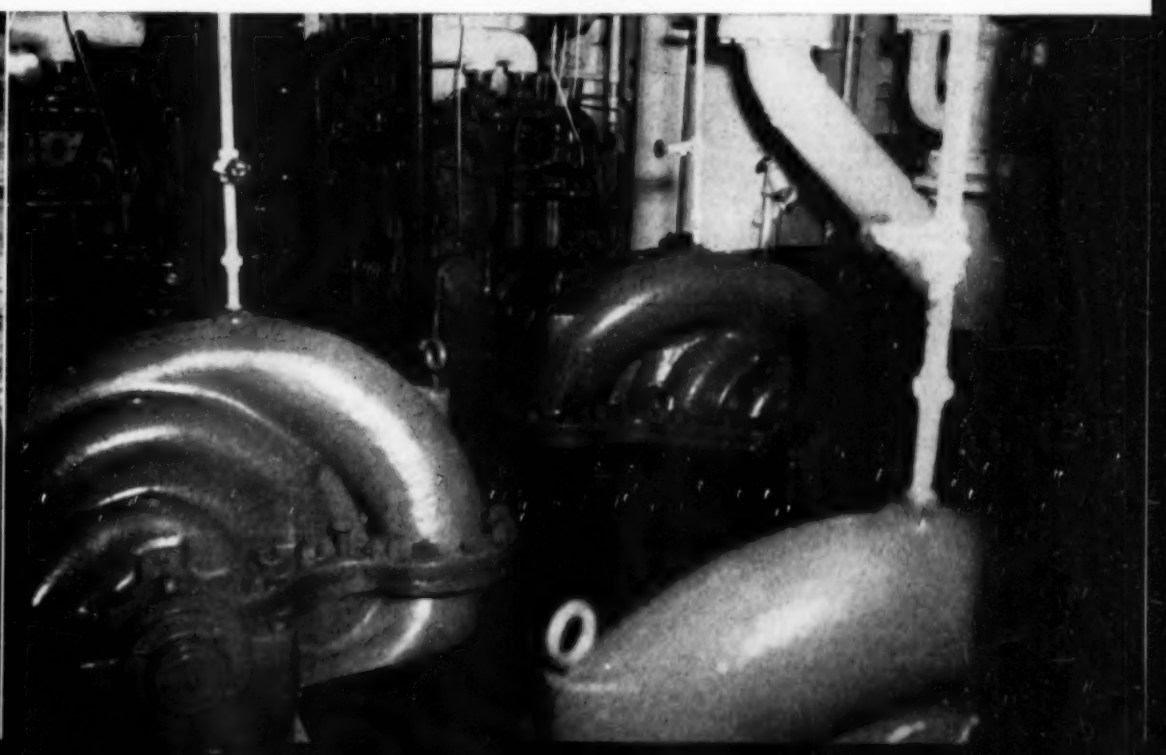
A National Foam System installed aboard includes two 250 gallon tanks, with a foam capacity of 165,000 cubic feet. The forward pump handles the foam. It is discharged through the forecastle monitor and the four hose outlets on the pilot house. There are ten 100-pound bottles of CO_2 in two banks on the starboard side of the engine room.

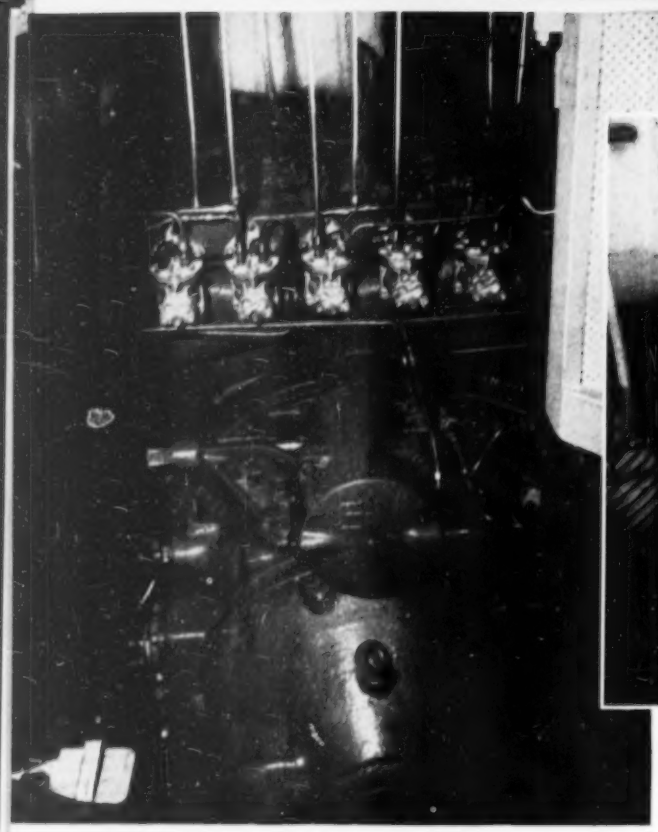


1. 550 hp. Cummins diesels—main propulsion and pumping. 2. 550 hp. Cummins diesel—pumping only. 3. 110 hp. Cummins diesels—maneuvering and generating. 4. DeLaval fire pumps. 5. Propeller shafts. 6. Generator, 7½ kw. 7. Snow-Nabstedt marine gears. 8. Snow-Nabstedt front power take-offs. 9. Waldron flexible couplings. 10. Link-Belt chain drives. 11. Ten-inch, 150-pound fire main loop. 12. Suction intakes from seachests. 13. Four monitors, on forecastle, pilot house, tower and fantail. 14. Riser to 330-pound shore connection, fed by two pumps in series. 15. Riser to 10-hose, multi-direction deck manifold. 16. Hose connections, front of pilot house.

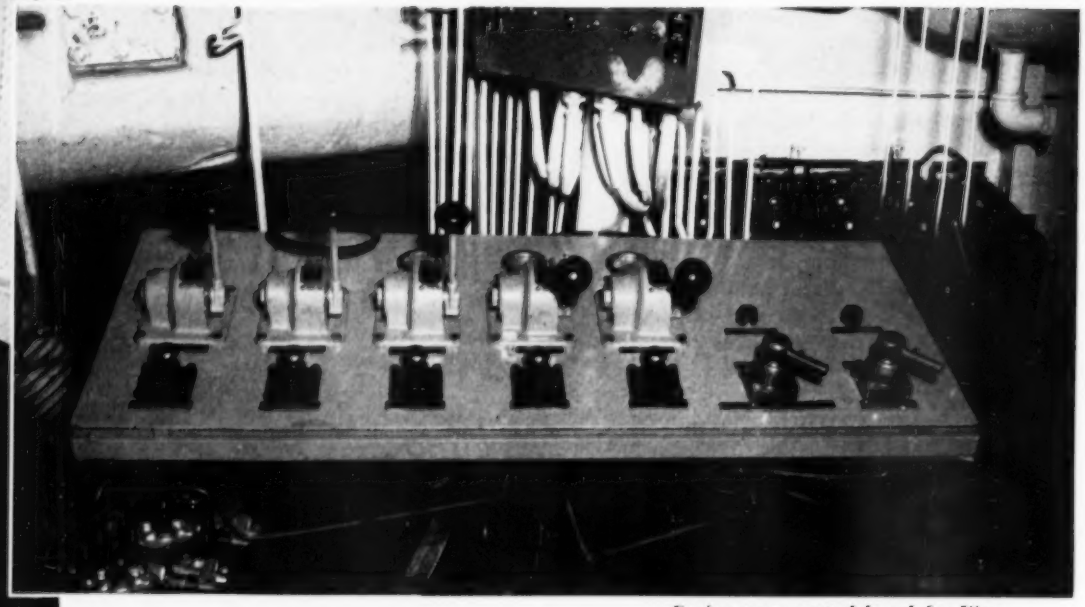
Arrangement of the three DeLaval fire pumps, looking aft. Two of these pumps, connected in series, can put 3200 gpm. @ 330 psi. into San Francisco's high pressure main if the boost is needed in an emergency.

and front power take-off are shown, with Michle-Dexter supercharger in center and Leece-Neville air starter immediately to the left.





Propeller shaft end of port main engine showing Snow-Nabstedt reverse reduction gear and the five relay valves of the Westinghouse Air Brake control system.



Engine room control board for Westinghouse Air Brake air-actuated power control system. In background, along starboard side, can be seen rack of Edison storage batteries. A section of one of the Maxim Silencers shows in upper left-hand corner.

This chemical extinguisher is piped to fixed nozzles in the forward and after holds. The CO_2 system also has one hand-controlled outlet for a 200-foot hose reel in the tower house, and another for a 50-foot hose reel on the port side, below. Smaller, hand-operated bottles of CO_2 are located strategically throughout the ship.

One emergency function of the fireboat is to force water when needed into San Francisco's high-pressure fire main. Near the deck manifold is an outlet for a shore connection through which the fireboat can pump 3,200 gallons per minute at 330 psi. into the city's high pressure main. Normal speed of the pumps is 1875 rpm. However, for this special duty, two pumps are connected in series and the speed is increased to 1935 rpm.

One of the first tests passed by the *Phoenix* was the augmentation of the city's high-pressure main. The boat maintained pressure and capacity for 30 minutes under supervision of inspectors from the National Board of Fire Underwriters. The *Phoenix* can pump water into San Francisco's Twin Peaks reservoir. The hydraulic elevating tower lifts a 2000 gpm. monitor 20 feet to a maximum of 50 feet above sea level. The hydraulic equipment, manufactured by the Rotary Lift Company, consists of an electric motor and pump unit, an oildraulic controller, and an 80-gallon oil reservoir. One of the outstanding features of the new vessel is the specially designed air-activated Westinghouse Air Brake control system. The control panel in the pilot house is duplicated in the aft end of the engine room, just at the bottom of the ladder from the well deck.

Launched February 1, 1954, the *Phoenix* was lowered into water by floating crane. Shown, left to right, R. P. Meehan, managing partner, Watson & Meehan, Northern California Cummins Diesel dealer; Hugh Munroe, naval architect for Plant Shipyard Corporation, Alameda, California; and B. R. Todd, partner and application engineer for Watson & Meehan.

Various studies made by the Harbor Commission convinces it that fuel, supplies, and maintenance of the *Phoenix* will average about $345 a month. If the Commission's plan for manning the vessel is implemented, it is estimated that the fireboat can be operated for $188,000 a year for all costs—operating and fixed charges, plus pay of operating crew and firemen. This compares with an annual cost approaching $400,000 a year for each of the last three years to operate the two steam boats. The figure of $188,00 looks good to the Harbor Commission after contributing an average of $198,000 annually during 1951-52-53 for its one-half share of costs for the two steam-powered fireboats. Faced with the prospect of paying all costs, or nearly $400,000 a year, the determination of the Commission to build a new boat can be understood. It figures that savings effected in two years will pay for the *Phoenix*. To show how costs have risen, the Harbor Commission found its average annual half share of the cost of running the *Scannell* and *Sullivan* was $64,000 a year from 1924 to 1928. Its average annual contribution for the 27 years from 1924 to 1951 was $95,000. Then the last three years the average tab for the state jumped to $198,000 a year.

Pioneering work done in 1930 established both John G. Alden and Cummins diesels in the waterborne fire fighting business. Nevertheless, there are unbelievers in San Francisco. They are mostly city officials with a grudge against the state, and veteran harbor fire-fighters who love their old steam boats. They call the new boat *The Flivver*, fooled by its compactness. On the other hand, Hugh Munroe, naval architect, who has investigated all modern fireboats, says "Per pound, per horsepower, and per dollar spent, the *Phoenix* will outpump any other modern fireboat!"

List of Equipment

Engines—5 Cummins Diesels: Three 550 hp. @ 2100 rpm., 12-cylinder supercharged, 4-cycle, 5½ in. bore, 6 in. stroke—two for propulsion and pumping, one for pumping only. Two 110 hp. @ 1800 rpm., 4-cylinder maneuvering engines.
Governors—Woodward Hydraulic.
Oil filters—Purolator on 550 hp. engines. Commercial Fulflo on 110 hp. engines.
Lubricating oil filters—Nugent on 550 hp. engines. Air-Maze on 110 hp. engines.
Air intake filters—Donaldson, on 550 hp. engines only.
Exhaust Silencers—Maxim.
Heat exchangers—Ross.
Reverse Reduction gears—Snow-Nabstedt.
Supercharger—Michle-Dexter.
Air starter—Leece-Neville.
Silent chain drive—Link-Belt.
Engine air control system—Westinghouse Air Brake
Fire pumps—Three DeLaval.
Air compressor—14.49 cfm. @ 700 rpm., 200 psi. working pressure. Westinghouse Air Brake.
Steering unit—Hydraulic Steering Booster. Hydraulic power unit, 3 hp. motor, 30 gallon oil reservoir. Vickers, Inc.
Acoustic telephone booth—Burgess-Manning.
Storage batteries—Thomas Edison.
Electric and electronic installation—Ets-Hokin & Calvan.
Exhaust hose—F. Somers Peterson; American Brass Products.
Fuel and lubricants—Tidewater Associated Oil.

MIAMI CHOOSES DIESELS

Diesels Assure Miami, Florida An Adequate And Certain Water Supply

By MAX GREITZER*

**Max Greitzer, Mechanical Engineer for the Department of Water and Sewers of the City of Miami, Fla.*

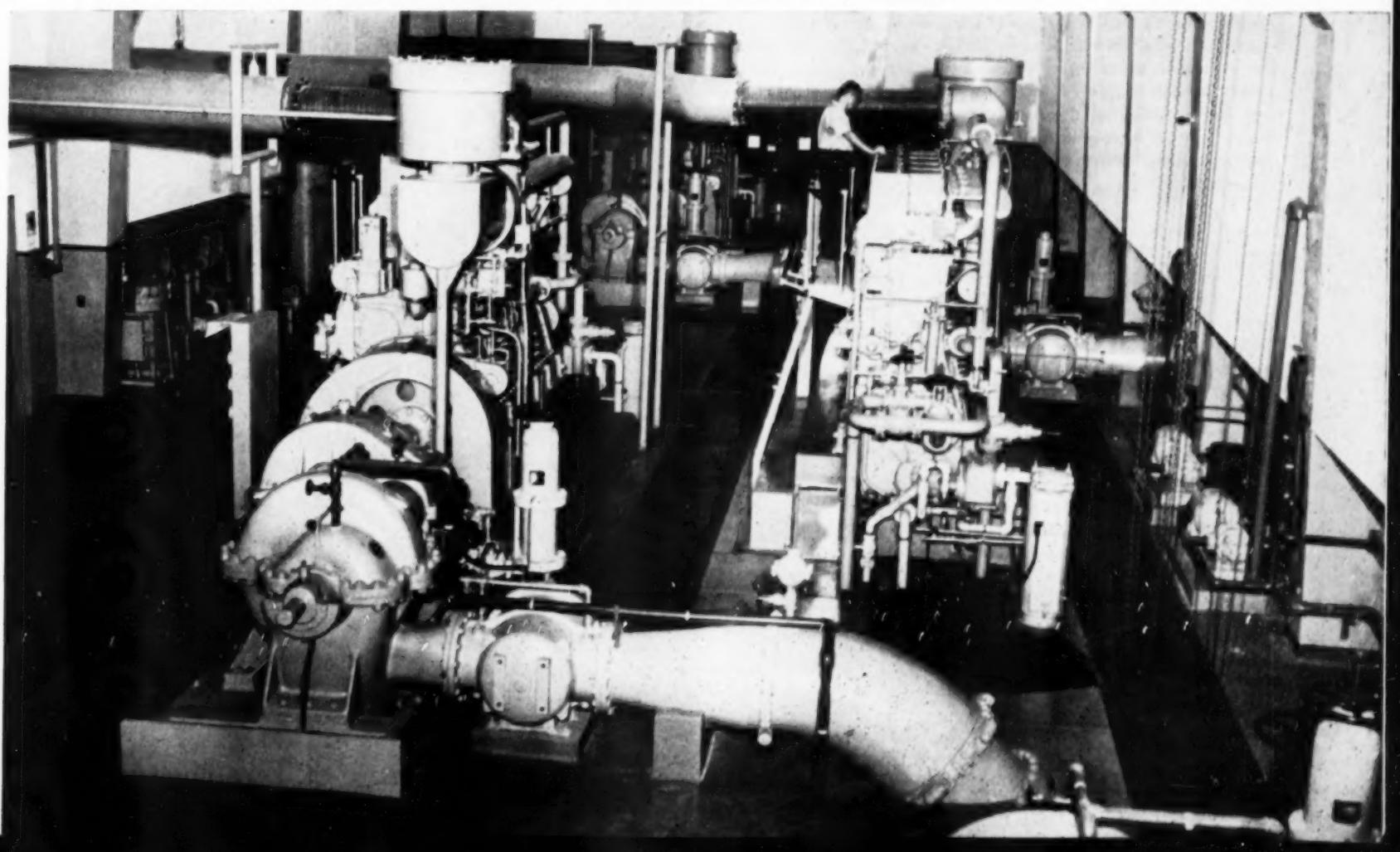
MIAMI, like other cities in the United States, found its water supply taxed to the limit because of the increase in population after World War II. The Department of Water & Sewers of the City of Miami started planning for the construction of new water treatment facilities. The existing treatment plant located at Hialeah, Florida, was enlarged during 1946, 1947 and 1948 from a 40 mgd. (million gallons per day) plant to a 60 mgd. plant by duplicating existing facilities. Raw water supply here is from wells 80 to 90 feet deep, located within a mile of the Miami River. Because some of these wells had become contaminated by salt water during a recent drought year, and since this salt encroachment might re-occur, it was decided to build a new plant at a new site. Raw water would be supplied from wells located a safe distance from any body of water which could possibly cause any future contamination.

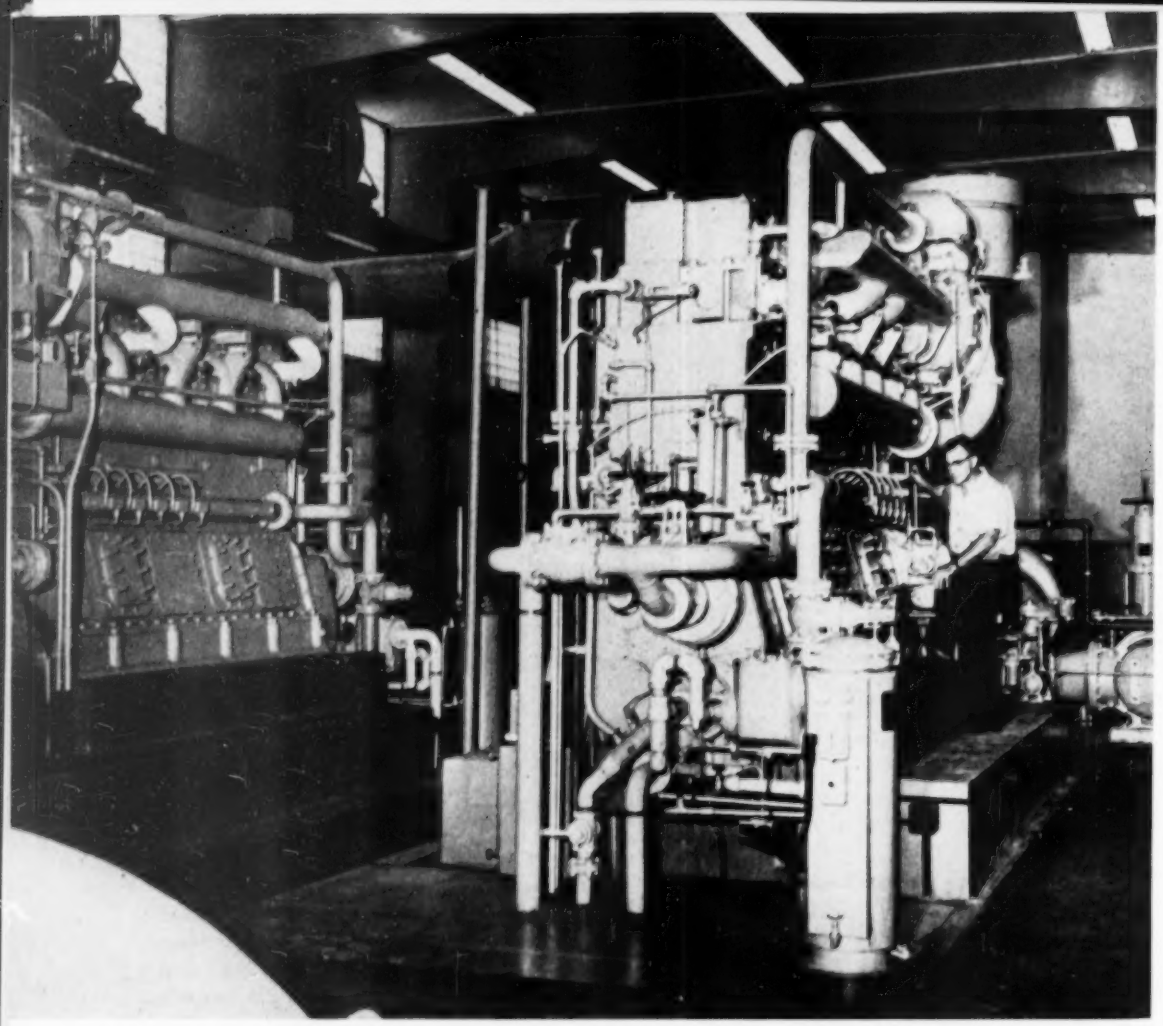
Acting on this decision, the Department purchased an 80 acre plot of land in the southwest section of Dade County for the new plant as well as 270 acres in the same section for a new well field. At the time, studies indicated that this new plant should have an ultimate capacity of 80 mgd. but that facilities for treating 40 mgd. should be built at the start.

The existing treatment plant is classified as a "Lime Softening Plant." Treatment facilities consist of mixing tanks, flocculators, clarifiers, CO_2, chlorine contact basins, and finally sand filters. After treatment the finished water is stored in a 3 mg. clearwell from which pumps deliver it into the Cities of Miami, Hialeah, and Miami Springs. The new treatment plant incorporates equipment for mixing, flocculating and clarifying in one basin. Since the first half of the projected plant called for the production of 40 mgd. of treated water, four treatment tanks, each rated to treat 10 mgd., were built. These four occupy about one half the area required for treating the same amount of water in the original plant. Carbonating basins, chlorine contact basins, sand filters, and a clearwell were still required under this new process.

One major problem in the early stages of design was to insure a safe, dependable source of power for driving the main station pumps and the many auxiliaries required in the operation of a water treatment plant. The City of Miami is located directly within the hurricane belt of the Western Hemisphere. From June to October, vicious and destructive hurricanes leave a path of wreckage as they plow their way through the countryside. During these fierce storms, falling trees and flying debris tear down many of the overhead power lines and leave live wires lying across streets and walk-

General view of the Worthington diesels installed in the Miami Water Treatment Plant. Note Worthington 16-LNC-35 centrifugal pump in the foreground. Air-Maze filter on left hand engine, Hilco lube oil filter to right, Cuno filter in middle of right hand engine.





One of the Worthington 825 hp. supercharged diesels. In the foreground is the Hilco lube oil purifier with the Cuno fuel oil filter to the left. The entire sale here included four 825 hp. Worthington diesels, a 600 kw. Electric Machinery generator is driven by one of the diesels, and three Worthington centrifugal pumps handled by the remaining three engines.

ways. The local power company generally de-energizes its distribution service to save lives, and does not re-energize it until they have made a thorough inspection to see if it is safe to do so. To assure that electric power to the Hialeah Treatment Plant would be uninterrupted, the power company installed two underground services directly from their substation to this plant. These lines are supposed to remain energized during hurricanes. However, the sub-station itself is supplied by overhead feeders from the main generating plant and is subject to the same interruptions as the rest of the transmission services.

In the existing distribution system, water is pumped from the Hialeah Plant by means of low-head pumps at a pressure of about 20-35 psi. Some of this water is stored in eight 2½ mg. storage tanks and in one 1 mg. elevated tank, a combined capacity of 21 million gallons. The rest of the water is picked up by pumps in high pressure booster stations and distributed to the retail, wholesale and commercial customers at pressures ranging from 55 psi. to 75 psi. The Cities of Miami Beach, Coral Gables, West Miami and Miami Shores are supplied with water by these same high pressure stations. The Cities of Hialeah and Miami Springs are supplied directly from the Hialeah Plant by separate high-head pumps. All these cities, together with the City of Miami, constitute the Greater Miami Area which has a population of about 500,000. The ground storage tanks are connected to the low pressure mains coming from the Hialeah Plant and normally take up the peak water demands occurring during the day.

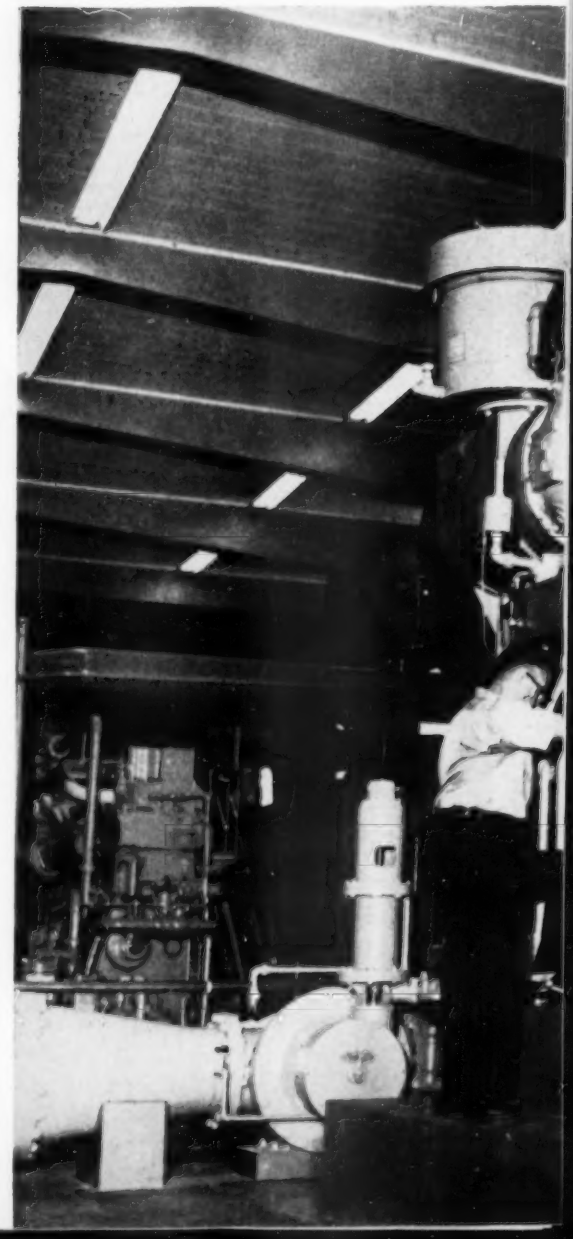
All the pumps at the Hialeah Plant are electric motor driven, and, with the exception of three 8 mgd. steam-turbine driven pumps, and one 11 mgd. gasoline-engine driven pumps, all of the pumps in the high pressure booster stations are electric motor driven. The two underground electric feeders should have insured that the Hialeah Plant would operate during hurricanes and that there would be water for the turbine driven and the engine driven pumps if and when power to the motor driven station pumps was interrupted. However, the feeders from the generating plant to the sub-station invariably failed along with the overhead feeders to the pumping stations, and the entire treatment plant was left without power. When this happened, only the 21 mg. of water stored in the tanks was left to meet the demands of the area.

Fortunately, the demand during a hurricane was usually light so that the steam-driven pumps and engine-driven pump were available to maintain some pressure in the distribution mains. So far, power has never been off long enough for the water reservoirs to empty before the Hialeah Plant could resume operation. However, there always remained the possibility that a fire would occur during a hurricane causing a demand for water that would exceed available storage. Therefore, in the design of the new plant, it was decided that seven emergency wellhouses be built and diesel-engine driven pumps installed in them for emergency service.

These wells were to be located at the new treatment plant site. Four were to contain vertical pumps driven by two 150 hp. high-speed engines; three were to contain similar pumps driven by only one 150 hp. engine. The latter units were to pump raw water at a low head to the treatment facilities. The four units were to be used for either the same low-head service or to pump raw water or treated water at a higher head directly to the city. As a stop-gap for alleviating the rapidly increasing demand for water the imemdiate construction of the first four of the proposed emergency wellhouses was contracted for in 1949.

During 1950, four million gallons of chlorinated raw water per day were pumped into the system for 43 days. In the meantime, a study was being made to determine whether it would be more economical to provide electric-motor driven pumps for the main pump room of the new treatment plant and to have high-speed diesel engine driven emergency standby units, or to eliminate the motor-driven pumps and have low-speed diesel driven pumps alone. Four 15 mgd.-225 foot tdh. (total dynamic head) pumps were required: three for firm service, one as a standby. The study covered five possible operating conditions to determine the most economical method. The final decision was to build a straight diesel pumping station. It constituted a departure from the practice of using electric motor-driven equipment for firm service.

To insure that the most efficient pump, gear increaser and engine would be obtained for the pro-

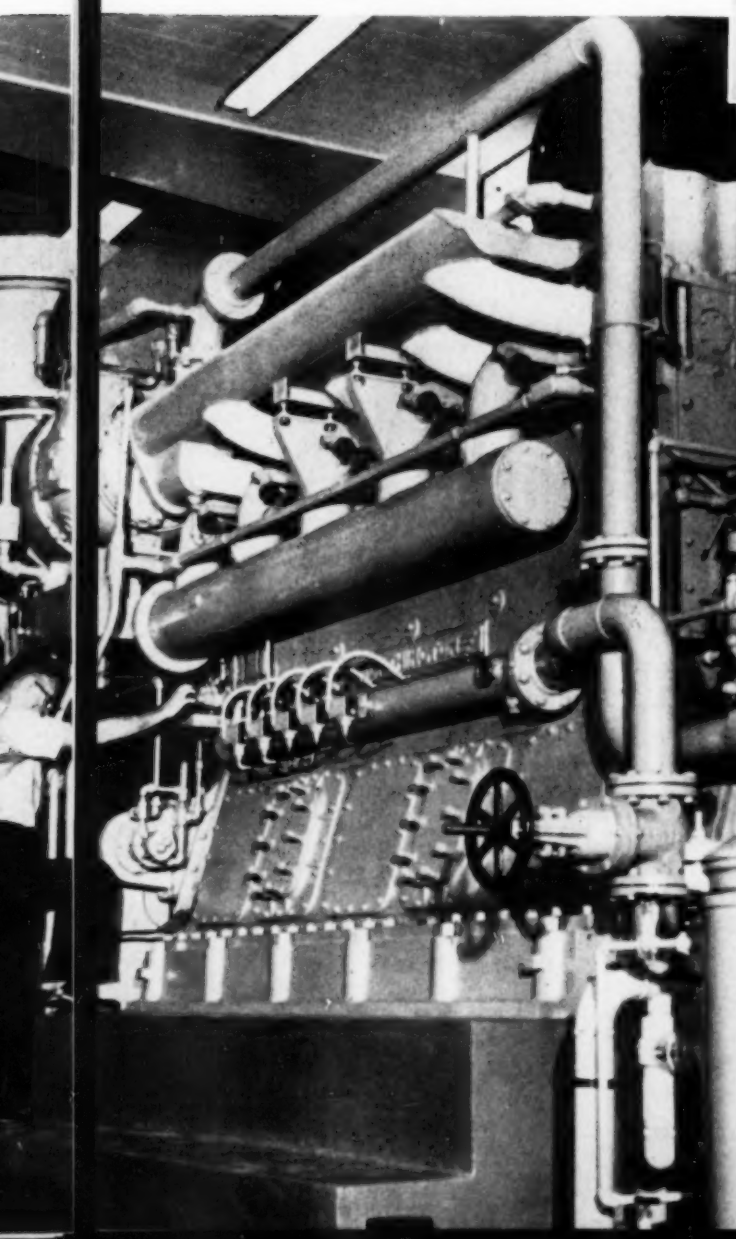


posed pumping units, specifications included a method for evaluating the efficiency of the proposed pumping units. Bidders were asked to include in their proposals the guaranteed pounds of fuel required to pump one million gallons of water at the rated tdh. of 225 feet. The millions of gallans of water that would be pumped from the plant over a 20 year period was estimated, and the cost for the fuel necessary to do the pumping was added to bid prices. The sum constituted the evaluated bid price of the installation.

Worthington Corporation was awarded the contract to furnish and install four SDR-5450 rpm., supercharged 825 hp. engines; four Worthington, 16-LNC-35 pumps rated 15 mgd. at 225 tdh.; four Worthington Type J6 gear increasers; a 600 kw. Electric Machinery Company generator, and all the auxiliaries for the operation of the units.

One unique installation feature is the pump room which is 44 feet wide, 154 feet long and 25½ feet high to a suspended ceiling. This room is completely sound-proofed. Little or not sound is heard directly outside the front of the building. At the rear of the building, only the slight sighing of the exhaust can be heard. The pumping unit founda-

Closeup of one of the four Worthington supercharged diesels in the Miami Water Treatment Plant. Fawick flexible couplings are used on all four engines as are Maxim silencers.



View of one of the Worthington diesels showing the Westinghouse switchboard with Alnor pyrometers. In the foreground is the gear increaser and one of the Worthington pumps. A 600 kw. Electric Machinery generator supplies the electric power in this plant.

tions were built on a four inch cushion of sand and the pump room floor was spaced away from the foundations. Consequently the units transmit no vibration. All this refinement was necessary to eliminate the possibility of creating a permanent noise nuisance to the nearby residential area.

The growth of the Greater Miami Area has been such that the plans for the second half of the treatment plant have been revised. Instead of the ultimate 80 mgd. as previously planned, a 100 mgd. plant is now being considered. When the entire plant is completed, we believe that it will be the largest and best designed diesel driven water pumping station in the country.

List of Equipment

Engine—Worthington SDR-5, 828 hp., 450 rpm. Supercharged. 13¼ in. x 17½ in.
Governor—Woodward.
Clutches—Falk.
Flexible couplings—Fawick.
Lube oil filter—Hilco.
Lube oil cooler—Sims.
Intake air filter—Air Maze.
Exhaust silencer—Maxim.
Exhaust pyrometer—Alnor.
Cooling water pumps—Worthington.
Switchboard instruments—Westinghouse.
Generator—Electric Machinery.

THE NEW FORD DIESEL TRACTOR

By F. HAL HIGGINS

THE British Ford tractor is over here again and starting to move out to the farms and construction jobs. This writer has been out in the field watching the numerous demonstrations and talking the diesel tractor over with the distributors. Tilton Newell of the Ford distributor set-up at Richmond, California extended an invitation to me and which I accepted, to go out to Pleasanton and attend a session of the school being run by the Pacific Tractor and Implement Co., Ford tractor distributor for Northern California and Western Nevada.

"We have just completed a diesel service training school for the service managers and mechanics in our dealer organization," summed up advertising and sales promotion manager Newell as we checked my pictures after we returned from an afternoon at the school. "It was a three-day training school during which time they had the opportunity to go through the tractor completely, dismantling and reassembling each unit in the shop. With the aid of visual casts, a discussion was held on each assembly. During the sessions just completed we trained approximately 100 men."

I subsequently caught up with one of the one-day dealer demonstrations at Riverside, California on my way out to Arizona in mid-January. The demonstration was about 8 miles outside of Riverside, a mile or two east of March field. This area was the site of one of the famous bonanza wheat farms of the gay '90s when Los Angeles was a sleepy little town circled by wheat fields. It was here that Charley Kerr was seen operating one of the Best 110 hp. steam tractors pulling 96 feet of plows and seeders, according to one old-timer. It was here out of Riverside that the famous "cannonball" orange express trains began moving fresh oranges across the continent in 1886.

The Ford diesel demonstrating on a Towner pull-type 8-ft. 3 in. disc harrow at the Riverside Day where farmers came to watch, ask questions and try their hands at the controls.

One of Bill Worden's service men at the dealer's demonstration day at Riverside. Facing camera, Carl Squier.

School days for dealer managers and service men at Pacific Tractor & Implement Co. They are going over the imported Ford diesel at the distributor's farm near Pleasanton, California.

A flat field with a farm house for headquarters was the site of the field day. Farmer Joe Stinchcomb cooperated with land and building to give dealer Bill Worden the setting for his show. Worden covers all of Riverside county except Coachella Valley. Palo Verde Valley is also out of his territory. Also present was the Los Angeles distributor's contingent. "We have all of Southern California from Fresno south over into Mexico to include Sonora, Sinola, Nigarit and Baja California; also Arizona and the Hawaiian Territory," explained assistant sales manager H. J. Hassalette.

Mr. Hasselette continued, "Most of the equipment we team up to sell with the Ford tractors is produced by local manufacturers because it is suited to the territory and the tractor. This includes the Towner line of discs and other heavy duty implements; Newkirk Mfg. Co., of Anaheim, who build the "Tillaplow"; Wilkerson & Nutwell of Fresno, who now build the Coviello reversible disc plow and the Rex reversible mouldboard plow. Hydraulic Tool & Equipment Company of South Gate was represented by it hydraulic controls on several items seen at work."

This British Ford tractor is not a Johnny-come-lately to the tractor field. Its development goes back to before World War I when Henry Ford started studying the farm market. It has at least 68 years of Ford thinking and 50-years of Ford engineering behind it. This diesel tractor also arrives in the U.S. with years of British development behind it.

Known as the Fordson Major Diesel Tractor, this rubber-tired tractor is manufactured by the Ford Motor Company of Dagenham, England, and imported by the Ford Motor Company Tractor Division of Birmingham, Michigan. It is a full 3-plow tractor. It is supplied with two sizes of rear tires. The 11 x 38 adjustable tread for the Row

Crop model, and the 14 x 30 non-adjustable 58-inch tread on the Standard Tractor. The front axle, or the tread of the front wheels, is adjustable from 52 to 72 inches. The tractor comes completely equipped. Standard equipment includes hydraulic lift and linkage, wheel weights, power takeoff, starter and lights, tool box, and necessary hand tools.

The power plant is a simplified direct injection full diesel engine. Top engine speed is 1870 rpm. It is a valve-in-head type with rotating exhaust valves. It has replaceable wet cylinder liners or sleeves. The bore is 4-inches and the stroke 4½ inches with a 220 cubic inch displacement. Compression ratio is 16:1. The pistons use five rings, three compression and two oil control. Connecting rods feature replaceable bearing shells at the crank end. The engine is equipped with 5-bearing crankshaft and a 5-bearing camshaft. The main bearings on the camshaft have replaceable shells.

The crankshaft is carried in the upper part of the engine in the engine block, so there is a main bearing on each side, or both sides, of each connecting rod. The lubrication is by gear type pump in the sump of the engine and all working parts are pressure lubricated.

Engine oil is filtered by a full flow oil filter with a replaceable element. The engine is completely sealed. Engine oil is filled through the top of the valve cover. Any pressures built up in the crankcase are bled off by a small tube from the valve cover to the intake manifold and these pressures are dispersed throughout the combustion chamber and the exhaust.

Filtration of fuel oil, an important factor on tractors operating under dusty conditions, is amply provided for on the Fordson Major tractor. There are five points provided for filtering. First, the fuel is filtered at the tank, then it proceeds to the diaphragm pump where settlings are filtered. From there, it is pumped to the special filter attached to the side of the engine. After this third filtering, it proceeds to the filter on the rear end of the fuel injection pump, and finally into the gallery of the fuel fuel pump to the individual injectors. The fifth screen is located in each injector.

Tilton Newell, advertising and sales promotion manager for Pacific Tractor & Implement Co., Richmond, California, points out a feature of the new Ford diesel at the school for his dealer managers and service men.

Other construction features are the heavy duty transmission and an 11-inch clutch with nine pressure springs. The transmission is exceptionally well built and represents approximately 40% of the cost of the tractor. It is very rugged and has exceptionally low power loss. Brakes are located on the first reduction shaft at the outer end. They are of the internal expanding and self-energizing type. They are actuated by foot pedals at the right of the operator, the right pedal for the right wheel and the left pedal for the left wheel. Both brakes can be applied with one foot. A simple locking device locks both brakes when using the tractor for stationary work.

The drawbar horsepower of the Fordson Major diesel tractor is approximately 36.4. Because of the low power loss in the transmission and the lugging ability of the engine, the tractor delivers 5300 pounds pull at the drawbar.

At Riverside, the British Ford diesel demonstrates on a two-yard Overland scraper with sales manager Rex W. Bradley on the tractor.

TUG-BOAT P

Recent Addition To The Boston Tow Boat Company Fleet Packs 80 Percent More Power Than Its Predecessors. The New Craft Features A Cleveland Diesel Division Engine With A Rating Of 1000 SHP And An Electric Drive.

AT POWER UPPED BY 80 PERCENT

By DWIGHT P. ROBISON

OVER the past 20 years, the trend in shipbuilding has been to larger ships, and especially tankers. Power required in tugboats was increased porportionately to facilitate the docking of these larger ships. About four years ago, both the Atlantic Refining Company and Esso Standard Oil Company put in service their first 1000 shp. 103 ft. diesel-electric tugs. The most recent delivery in this class of tugboat was the *Mars*, which has been added to the fleet of the Boston Tow Boat Company, a subsidiary of Eastern Gas and Fuel Associates, at Boston, Mass. The Boston Tow Boat Company tugs are engaged in general servicing of cargo vessels, tankers, passenger ships, etc., in the Port of Boston and Massachusetts Bay.

This demand for greater power in tugboats is clearly brought out by the 100 shp. *Mars*. The *Mars* has 80% more power than the two other diesel-electric tugs of the Boston Tow Boat Company—the *Luna* and *Venus* which were purchased in 1930 and are still in service. The main engines of the *Luna* and *Venus* are twin Winton's with a combined rating of 650 bhp. per boat. The company's experience with other tugs of 1000 hp. or more, brought home the importance of additional power.

The *Mars* was built by the Gulfport Shipbuilding Corporation, Port Arthur, Texas and the Design Agent for General Motors for the building of this tug was Tams, Inc., of New York City. She has an over-all length of 103 ft.; molded beam of 25 ft. 1½ in.; molded depth of 12 ft. 11 in.; load displacement of 300 LT; propeller diameter, 8 ft. 10 in.; propeller pitch, 7 ft.; and a tank capacity of 22,037 gal. fuel oil. This makes it possible for the *Mars* to operate practically a month without refueling.

The propulsion plant is a General Motors diesel-electric drive system completely engineered to provide a compact unit with the greatest of mechanical and electrical simplicity. The main propulsion diesel engine driving the generator is a General Motors Model 12-278A, 12 cylinder, 1200 bhp, 2 cycle engine. This engine is directly connected to an 814 kw., dc. generator for supplying current to the 1020 hp. 690/875 rpm., two wire shunt wound propulsion motor. The motor is directly connected to the high speed pinion shaft of a single reduction gear. The propulsion shafting is connected to the reduction gear and is capable of delivering over 100 shp. at 160 to 200 rpm. to the propeller. When under heavy tow, the motor may be operated at reduced speed, but at full voltage and full power with full engine speed, by increasing its field current to a value which will allow maximum armature current without overload. A current limiting device, which regulates the generator field current, is provided to limit the current in the propulsion look to 125% full load value, and to protect the electrical machine against momentary excessive current caused by rapid acceleration and reversing.

The engine room and all quarters have forced ventilation. Two wing blowers take air from cowlings above after end of the deck house and supply it to the engine room at a rate of 6300 cfm. each. The air is ducted where necessary with main duct discharging below the reduction gear unit and the other under the floor plates at the main generator. The quarters blower is mounted in the upper engine room and has a capacity of 2002 cfm. This air is drawn from the outside above the deck house and ducted to all quarters. Mushroom vents are of welded construction extending to a suitable height above deck, and down to compartments served. Two 8 in. mushroom vents on boat deck run to forecastle, two 8 in. to galley, and one to crew's toilet, one 8 in. to each engineer's quarters, and two 12 in. to engine room. A 500 cfm. blower is installed in galley to exhaust warm air.

There is a raised pilot house forward on the boat deck. The Captain's quarters are immediately aft, equipped with a bunk, desk, wash basin and locker, and with a door aft leading to the boat deck. On the main deck there is a large room forward with double berths for the mates and a single berth for the cook. The galley is just aft of this room with a passageway to provide access to either forward cabin or engine room aft. The after deck house is divided with a cabin on the starboard side for the chief engineer and one on the port side for the assistant engineer, with officers' shower and toilet between. Both cabins are equipped with double berths, desk, wash basins, built-in seats and lockers. After quarters lead into the engine room. Entrance to the crew's shower and toilet is from the deck and is located just forward of the engine room on the port side. Additional crew's quarters are located in the forecastle with four pipe berths in pipe frames, four metal lockers, one mess table, and two benches. All quarters above deck have doors and trim of mahogany. Outside doors on main deck dog water tight on rubber gaskets. All openings to the outside have insect screens.

Walls and ceiling in all quarters, forecastle, galley, pilot house and cabin which are exposed to outside climatic conditions are insulated with 1 in. fiberglas board. The upper engine room is insulated with 2 in. perforated marine veneer. Pilot house and cabin floors are laid with heavy linoleum cemented to deck with felt between. Floor of quarters on main deck, including galley and toilets are lead with asbestolith cement about 1 in. thick and with wire mesh welded to the deck.

Auxiliary ship's service electrical power at 120 volts, dc., is supplied to the distribution switchboard from one 30 kw., 120 volts, dc., two wire, self-excited diesel driven generator. One 24 kw., 120 volt, dc., two wire auxiliary generator driven from the main propulsion generator, supplies all propulsion control and excitation power through the exciter control panel. A set of ship's service batteries consisting of 56 cells marine type float on the line and thus supply power to the distribution switchboard when the auxiliary generators are shut down.

ELECTRO-MOTIVE MODERNIZES 567 ENGINE

By BRUCE WADMAN

IN conjunction with the development of the new 567-C diesel engine, which was described in the January, 1954 issue of DIESEL PROGRESS, Electromotive Division of General Motors Corporation has announced a modernization program for the old style 567 engines to incorporate many of the important improvements that were designed into the "C" engine. Electromotive can build into any old style 567 engine the following mechanical advantages, which will result in longer life and reduced maintenance cost.

1.—Individual water jumper lines from the water inlet manifold to cylinder liners, eliminating the upper and lower liner seals; this type of installation eliminates interim engine overhaul for re-sealing and prevents water leaks into the oil pan with a possible resulting crankshaft failure.

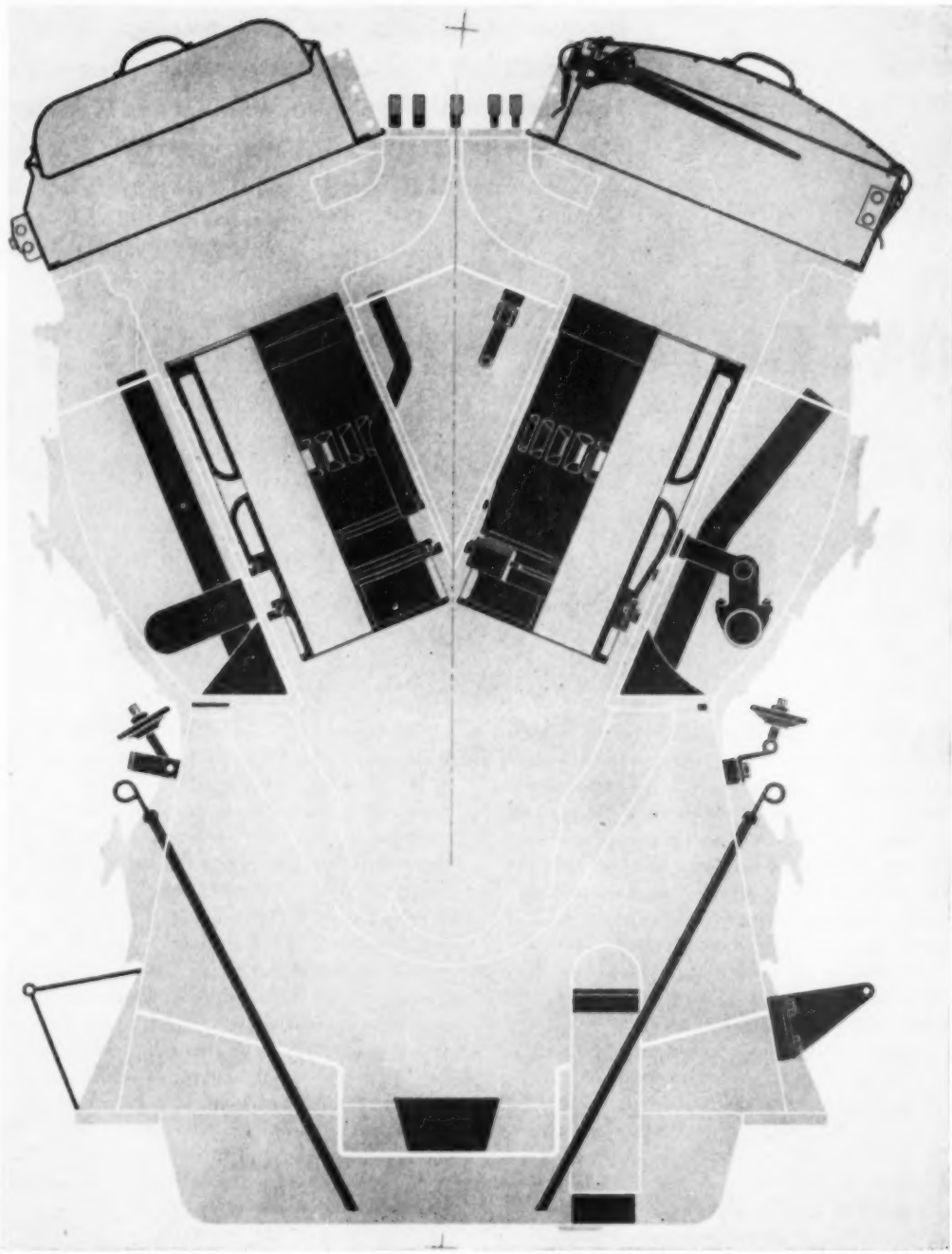
2.—Crankcase upper and lower pilot bores are machined to new tolerances. "C" type liners are utilized in the conversion; they are purposely made with a large upper pilot bore diameter to allow machining to these new tolerances in the crankcase without weld build-up on the liner pilot bores.

3.—Replaceable wear rings at the lower liner pilot bores between the liners and the stress plates absorb the wear originally taken by the lower pilot bores of the crankcase. These wear rings eliminate the heavy weld build-up and machining of lower pilot bores generally found necessary on the majority of engines and also controls clearance at this point, reducing wear at the top liner pilot bores.

4.—Easily removable water inlet manifolds made of steel tubing do not require welding of any nipples or supporting straps on the air box gussets or other stress areas. These pipe manifolds eliminate water on lower stress plates and permit expansion, thus eliminating difficulties found with manifolds welded to the crankcase.

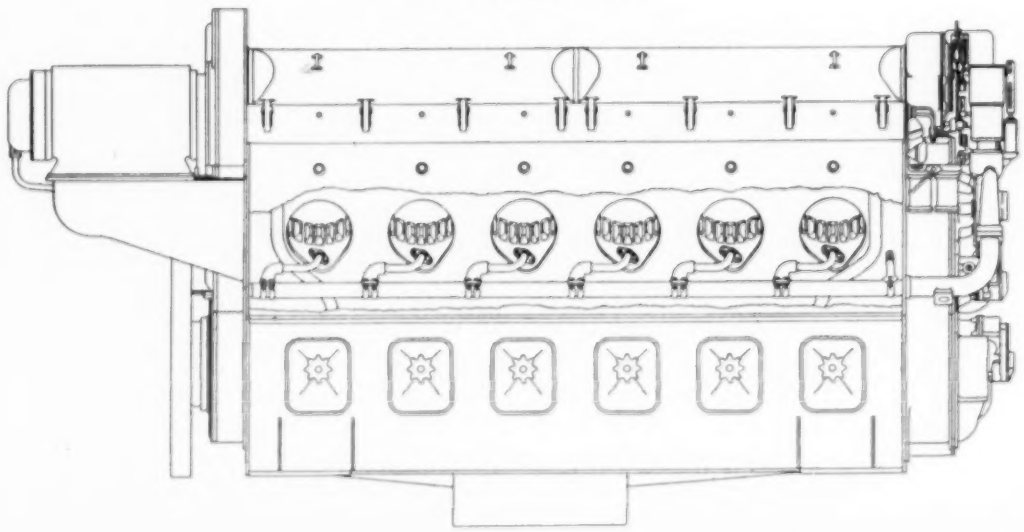
In the conversion, old style cylinder heads are retained and utilized, and the new "C" liners are interchangeable with the liners used on the new 567-C engine. Liners have full length water jackets to provide for more complete cooling to eliminate "hot spots" that cause lube oil oxidation.

The engines to be modernized are completely torn down, and assembled again on the new engine assembly line along with the "C" engines going through. Thus, much of the engineering and designing that led to the improved 567-C engine is now incorporated in the old model 567 engines to improve performance and lengthen their life.



On the left half of the drawing above, the original 567 design; on the right half, the modernized 567 engine design including other minor modifications besides the major changes described in the text of the accompanying article.

Drawing of the side-view of the modernized EMD 567 engine showing the new water manifold and jumper design.



At last...a proven better way to kill Diesel Exhaust Fumes!

NEW OCM DIESELER

Cleaner, safer air wherever you run a 4-cycle diesel engine — better control of noxious diesel exhaust fumes — that's what this tremendously important new catalytic invention means to you today.

The OCM Dieseler reduces — below objectionable levels — dangerous hydrocarbons and carbon monoxide in exhausts from all 4-cycle diesel engines. Compact catalytic units "burn out," by catalytic reaction, 65-85% of the unpleasant, harmful fumes — 80-90% of the dangerous carbon monoxide — whenever your engine is operating at over 60% load.

Think what this means almost everywhere diesel engines are used!

Now, with the OCM, it is possible for some mine operators to use standard diesel equipment underground.

Now 4-cycle diesel bus and truck operators can promote better public relations and good will by eliminating foul-smelling smoky exhausts.

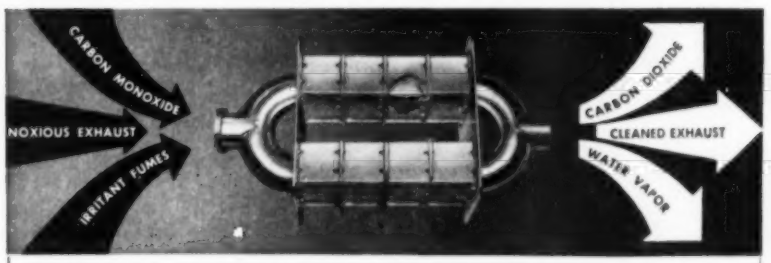
Now both stationary and mobile diesel-powered equipment can run more efficiently in industrial plants.

Requires Little or No Maintenance

The OCM Dieseler is designed to replace any standard diesel muffler. It can be connected to the engine exhaust manifold quickly and easily by your own mechanics. It is strong, compact and rupture proof. Maintenance is practically nil. Tests show that the Dieseler will give you up to 2000-2500 hours of trouble-free service before the catalytic units need renewal. Replacement is simple and low cost.

A Houdry Catalyst

The OCM Dieseler was invented by Eugene Houdry, who developed the catalytic process for cracking petroleum and who is world-renowned in the field of catalytic research. Almost anywhere you use 4-cycle diesel equipment, the OCM Dieseler can bring important benefits to you — in more efficient performance, in increased employee productivity and morale, and often in better public relations as well. Mail the coupon for complete information and technical data now.



OCM Dieseler, Duoflow model. Catalytic units (see cutaway) oxidize irritating, dangerous exhaust fumes and odors to harmless carbon dioxide and water vapor. Uniflow and Quadriflow models also available to equip almost any size engine.

OCM CATALYTIC EXHAUST FOR GASOLINE ENGINES

The OCM Catalytic Exhaust does for any engine burning non-leaded gasoline all that the Dieseler does for diesel equipment.

This Catalytic Exhaust eliminates 95% or more of the carbon monoxide — 90% of the hydrocarbons — from any engine in which you use non-leaded gasoline. With the OCM Catalytic Exhaust you can operate lift trucks, tow trucks, loaders, auxiliary generators in even closely confined areas continuously, efficiently and *safely*. Wherever you use gasoline-powered equipment indoors, you need the OCM Catalytic Exhaust.

OXY-CATALYST, Inc.

WAYNE, PA.

MANUFACTURING • ENGINEERING • RESEARCH

Fume elimination processes and equipment for internal combustion engines—for incinerators—for consumer products—and for industrial air pollution control and heat recovery.

NOTE. Dealerships for both OCM Exhausts are now available in most major markets. Write for full details.

OXY-CATALYST, INC., Wayne, Pa.

Send complete information on ☐ OCM Dieseler; ☐ OCM Catalytic Exhaust for gasoline engines.

☐ I am interested in a dealership

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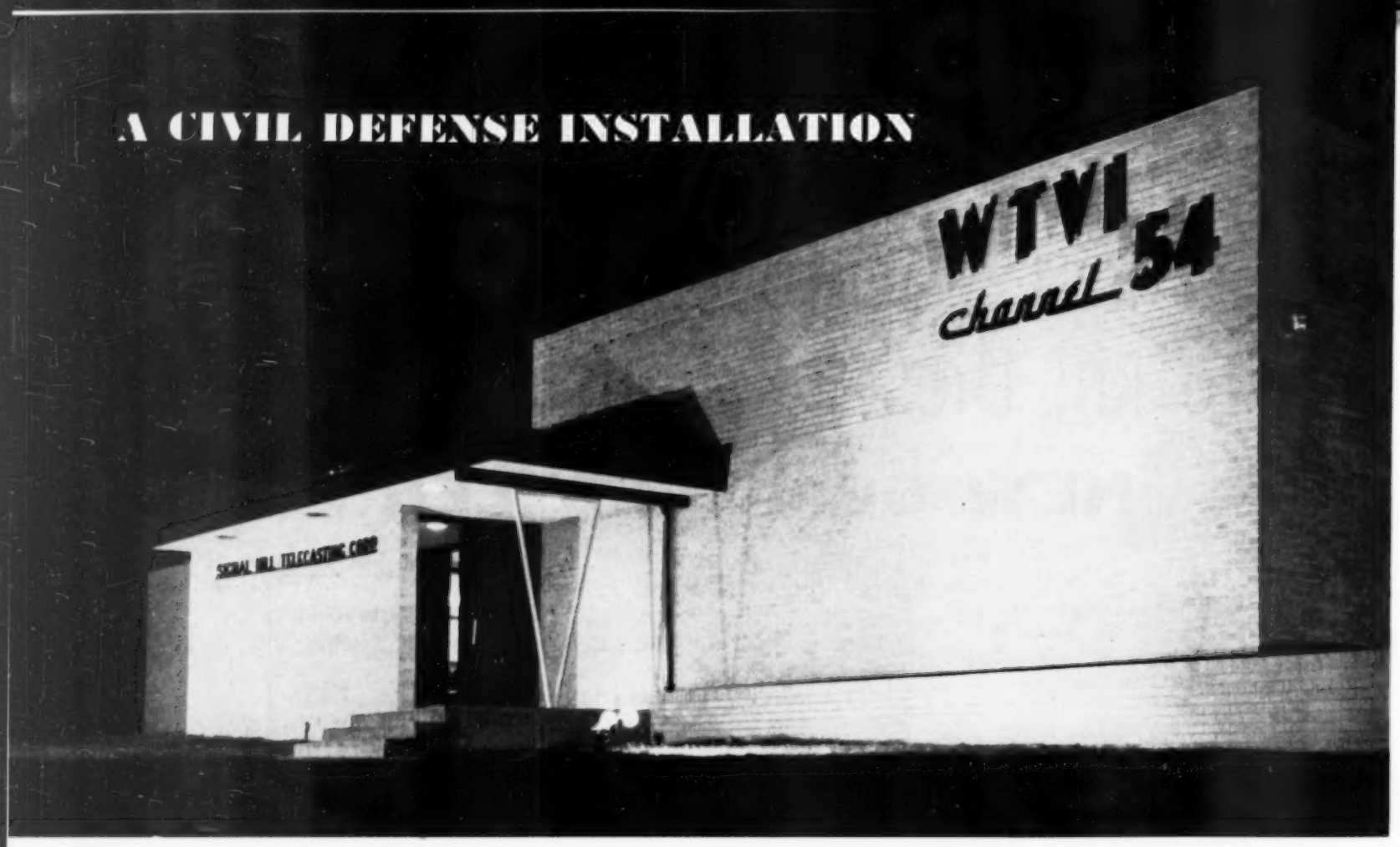


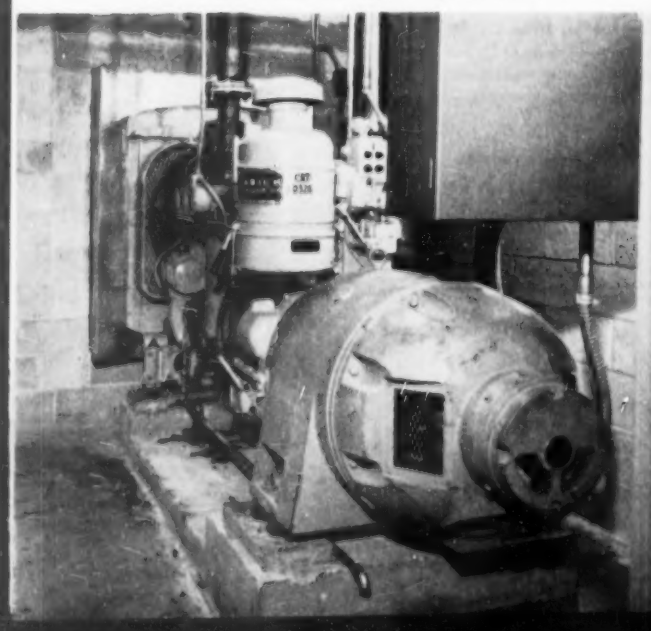
EMERGENCY POWER PACKAGE

THREATS of sudden losses of power caused Signal Hill Telecasting Corp. to install a diesel electric set in their newly-constructed station, WTVI, at Belleville, Ill. Storms had subjected the Belleville area to a number of power failures—electricity had remained off for as long as four hours on several instances, so the purchase of the standby unit was considered good insurance against being cut off the air.

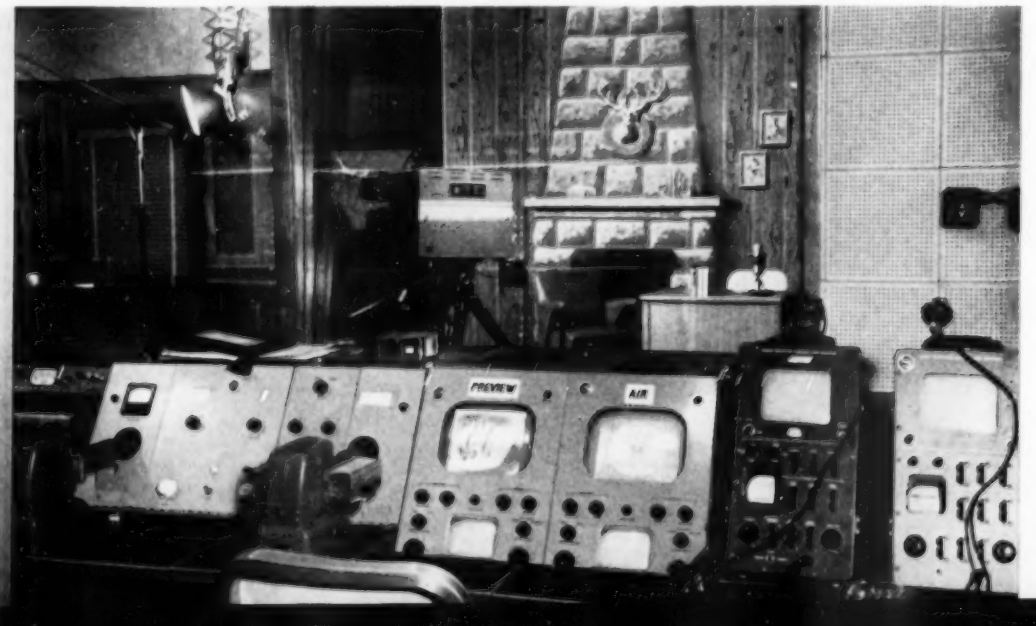
The unit consists of a Caterpillar D326 electric set equipped with an automatic transfer switch that starts the diesel engine immediately when the regular power supply fails and places the unit into service within eight seconds. The three-phase, 208-volt, standby power unit operates a General Electric 12 kw., UHF transmitter on channel 54. Since the studios and transmitters are located in the same building, it is interesting to note that the Cat D326 standby unit operates the synchronous generator and projection camera which are extremely sensitive to frequency variations. The same type of non-premium fuel supplies both the diesel engine and the station's heating unit, which saves on operating costs. Only the supply tank was installed to supply fuel to both units.

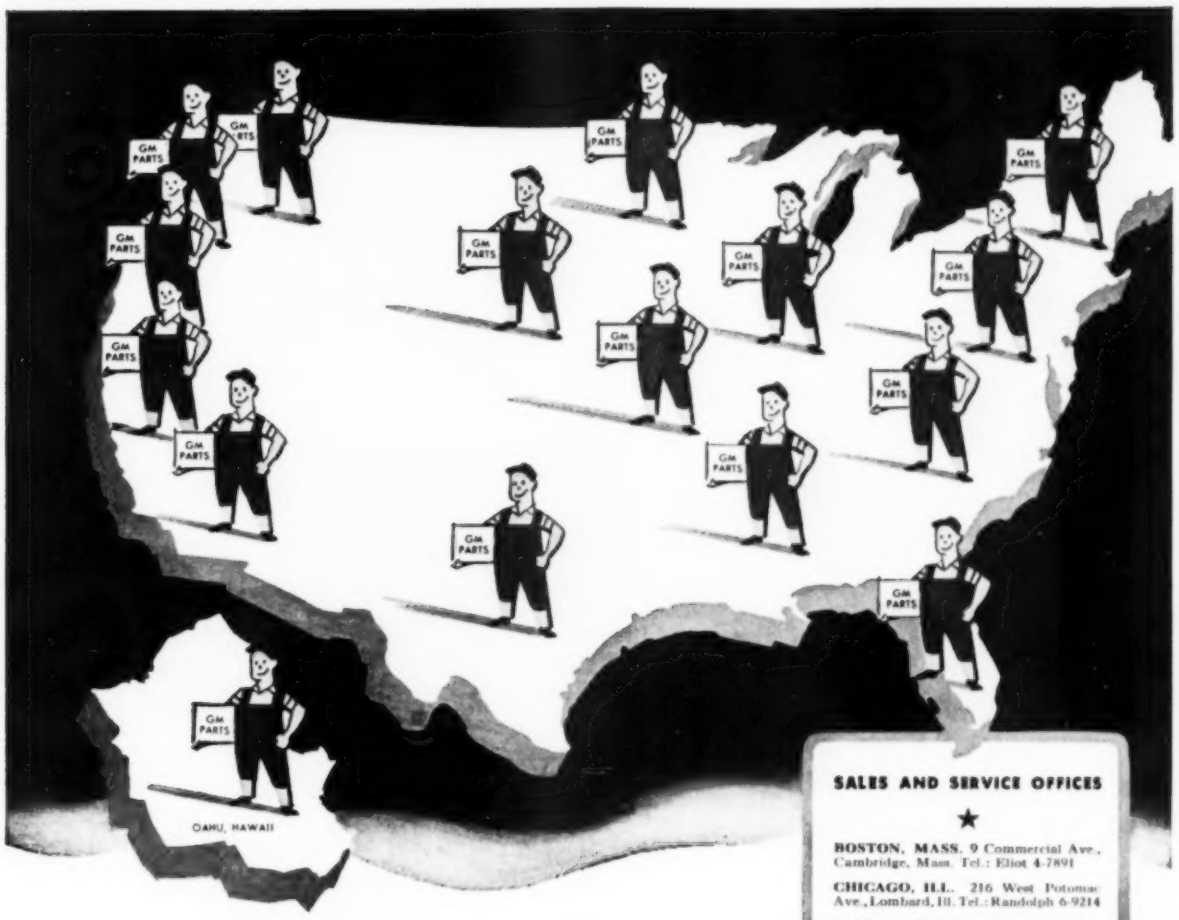
Nearby Scott Field Air Base imposed restrictions on WTVI's tower, limiting it to a height of 600 feet. The station has had reports of good reception up to 60 miles on a one kw. transmitter, however, and expects to reach an effective radiated power of approximately 244,000 watts with their new 12 kw. transmitter. Station WTVI has two TV cameras in its studio and a complete mobile unit also equipped with two cameras. The telecasting schedule now consists of eight live shows per day along with a basic DuMont Network affiliate. Forty to fifty employees man the station. This is another example of diesel's role in civil defense.

The Caterpillar D326 electric set equipped with an automatic transfer switch that starts the engine immediately when the regular power fails.



The control room of the Belleville station, WTVI. A dependable source of power is a vital aspect of civil defense. Diesels assure that dependable source of power wherever and whenever needed. They guarantee maintenance of communications.





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GM GENERAL MOTORS DIESEL POWER

Tie Up to GM Service

The mechanic servicing this new Kenworth cab-beside-engine truck has his work right in front of him. The entire right side of the engine compartment lifts up and the mechanic can walk right up to the engine.

The new Kenworth truck pictured here is powered by a Cummins Model NHB 200 hp. diesel engine. Kenworth trucks are normally powered with any diesel up to Cummins NHRBS 300 hp. or Buda DAS 844, 285 hp.

NEW HIGHWAY TRACTOR DESIGN

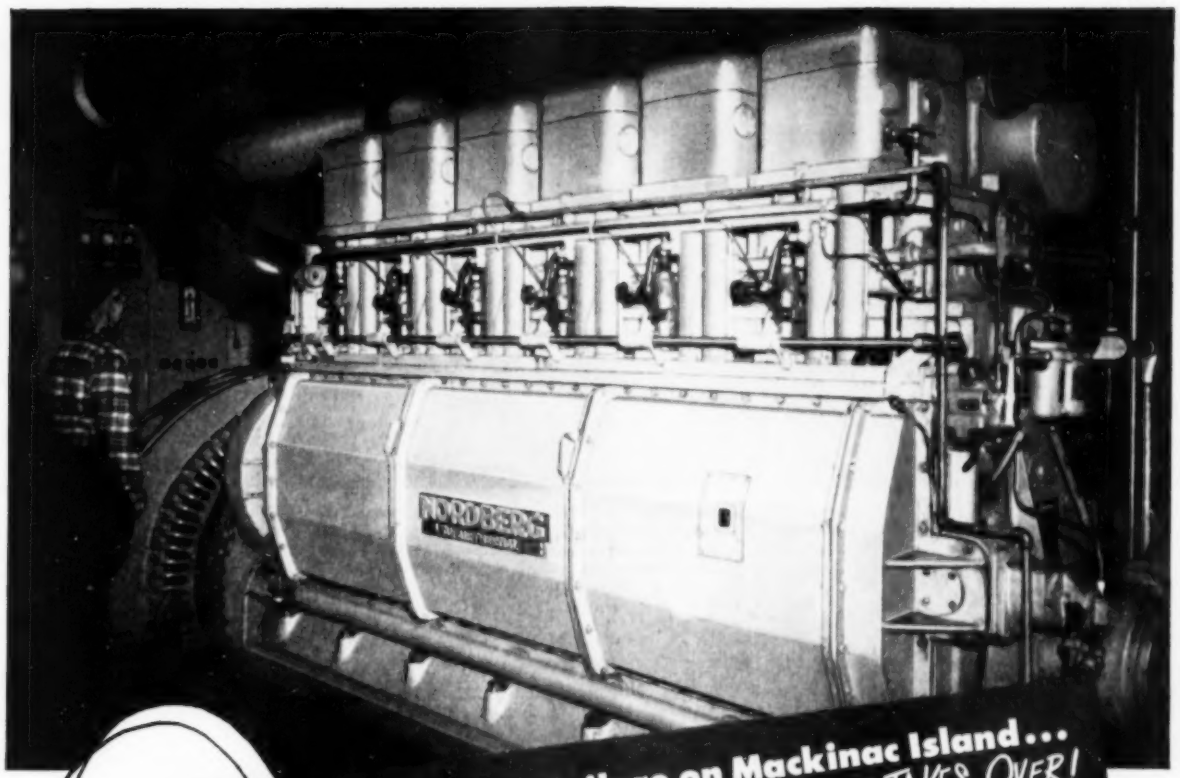
A completely new type of truck with revolutionary cab-beside-engine design and practically unlimited driver visibility will soon make its appearance on American highways. That's the news reported by John G. Holmstrom, vice president and general manager of Kenworth Motor Truck Corporation of Seattle, Washington, which designed the new truck and has produced pilot models. "The cab-beside-engine is a new development in highway trucking and a complete break with tradition," Holmstrom said. "It's an entirely new truck designed along functional lines, the result of an extensive program of engineering research—not an evolution of conventional design."

The need for maximum driver visibility dictated this new truck design, according to Robert C. Norrie, Kenworth's chief engineer. "We started with the requirements for ideal visibility and no preconceived ideas of how the finished truck would look," he said. "Our first thought in making every decision was its effect upon the driver's view of the road. As a result, he can see more than the driver of any conventional or cab-over-engine truck." As proof of unsurpassed visibility, Mr. Norrie cited the fact that the driver of the new truck can see the head of a man standing in any position next to the cab. He also mentioned that corner posts were made as narrow as possible, and that the left rear-view mirror is placed low to eliminate a blind spot. The driver can reach out and clean all windows from inside. The rider sits tandem to the driver, as in jet planes, with a good view of the road.

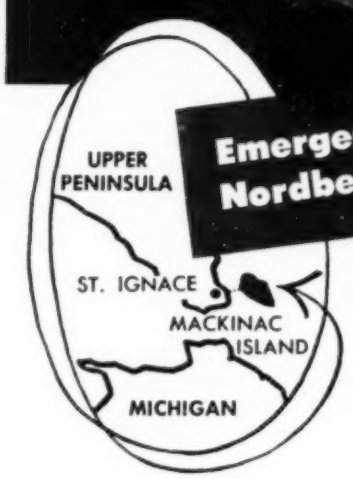
Better visibility is only one of the many advantages of the new Kenworth cab-beside-engine truck design. Others include reduced weight—largely the result of all-aluminum welded construction and simplicity of design, added strength, easier access to the engine, lower maintenance and repair costs, and more comfortable riding qualities, according to Mr. Holmstrom. The unit pictured here is powered by a Cummins Model NHB 200 hp. diesel. Kenworths are normally powered by any diesel up to Cummins NHRBS, 300 hp. or Buda DAS 844, 285 hp. Other features minimizing repair costs are the greater ease of access to the engine, especially on the right side. Engine and transmission can be removed with standard repair equipment. Exhaust comes directly from the engine, with no elbows or flexible tubing—another weight saving. This shortened, simplified exhaust system and the bolted-up style radiator can also help reduce service work. Core replacements are cheaper. Sheet metal units are small and can be replaced at low cost, if damaged. The drop-down panel for electrical switches and circuit breakers brings them down level with driver's eyes ready for easy maintenance. The bumper will bend without distorting the frame, and contains a retractable tow hook. The air intake is well placed to the right of the cab. Kenworth's functional design is highlighted by the return of the exposed radiator cap.

"Even the door is new," Mr. Norrie said. "It's the first departure from tradition in making truck doors in 25 years. A simple, strong one-piece aluminum extrusion goes clear around the door opening, forming the frame, window slide, seal and drip." The new Kenworth cab-beside-engine design has many features that should greatly reduce driver fatigue. Vibration has been eliminated by isolating the insulated, rubber-mounted cab from the rest of the truck and mounting the steering gear rigidly on the cab, rather than on the chassis. As a result, there is reduced vibration from the chassis or road to the steering wheel, and engine noise in the cab is practically eliminated. Since the cab is separate from the engine compartment, it stays cooler than other types of cabs. Another feature reducing heat and noise is the detachment of the exhaust pipe from the cab.

"The driver of a cab-beside-engine truck is more comfortable all year round," said Mr. Norrie. "In the winter, he's warmer, because there's less space to heat than in a conventional truck. In the summer, he's cooler, because the new design makes possible better ventilation closer to the driver." A specially designed fresh-air type heater, which pressurizes the cab, and the bulkhead ceiling of the access panel inside the cab keep fumes away from the driver. Better ventilation of the engine compartment is achieved by a ¾-inch gap between the cab and engine. Pilot models boast an air-actuated power clutch. The over-all dimensions of the new Kenworth CBE truck are the same as those of the present Kenworth cab-over-engine model: 70 inches long and 96 inches wide. The CBE is also available with sleeper cab.



Emergency power failure on Mackinac Island... Nordberg SUPAIRTHERMAL Diesel TAKES OVER!



● Electric service reaches Mackinac Island via submarine cable from the Michigan Upper Peninsula. When this cable was damaged recently, main power on the Island was interrupted about eight days, while special equipment was moved in to raise the cable and splice the break. According to the Edison Sault Electric Company, *"If the new Nordberg standby engine had not been immediately available . . . it is questionable whether or not service could have been maintained . . ."*

MACKINAC ISLAND, famous northern Michigan resort area, is served by the Edison Sault Electric Company, progressive utility with headquarters in Sault Ste. Marie, Mich. When unusual circumstances caused a temporary main power failure recently, the job of supplying the necessary electric power to Mackinac Island residents was immediately assigned to a new Nordberg 1200 hp *SUPAIRTHERMAL* Diesel Generating Unit.

Installed on Mackinac Island for emergency, as well as "peaking" service during the heavy tourist season, the new 800 kw Nordberg Diesel "took over" the full demand for about eight days, while the primary power line was being repaired. This installation is a good example of Nordberg engines serving the country's utilities, for both standby and main power supply. The next time you have a power problem, think of *Nordberg . . .* builder of America's largest line of heavy duty engines from 10 to over 10,000 hp. *Nordberg Mfg. Co., Milwaukee, Wis.*

NORDBERG

DIESEL • DUAFUEL® AND SPARK-FIRED GAS ENGINES

P254

Although the terrain in the foothills of the Cascade Mountains near Seattle, Washington presented transportation problems in moving mining equipment to the new Kromona mine site it was especially suitable for the construction of the project's 100 ton-per-day flotation plant. Photos were taken last fall before operations were suspended because of weather conditions.

DIESELS IN NEW TUNGSTEN MINE

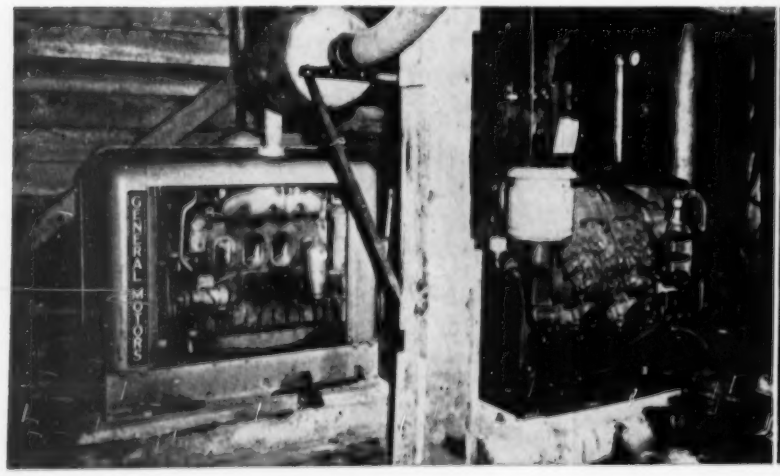
ORE with rich values in tungsten, gold, silver and copper coming out of a new mine in the Cascade Mountains 60 miles northeast of Seattle, Washington, justifies over 35 years of exploration and planning on the part of one of the country's most persistent prospectors. The prospector is Joe F. Krom of Seattle, head of the Kromona Mines Corporation, which was formed to operate the project. The mine is located on a mountain side twenty miles from the village of Sultan. This distance, Mr. Krom has walked, climbed and "pack-horsed" over the 35-year exploratory and planning period more times than he cares to remember.

In spite of difficult transportation problems approximately a million dollars worth of mining and processing equipment has been assembled at the mine site. Some of the equipment had to be lifted the final 2000 feet to the mine shaft by cable. And weather conditions required that the flotation plant and other buildings erected be constructed to withstand a roof load of 15 feet of snow. Because of the nature of surrounding terrain the cable line is an important part of the operation. It is used to lower the ore to the flotation plant and to lift mining and food supplies to the miners. Rather than descend daily, the miners are housed on the upper level for five-day periods. The flotation plant which is eight stories high, operates entirely on the gravity system. The ore is worked over twice in each section as it drops down through crushers, through a huge rotating cylinder filled with iron balls, and then through flotation processes and across riffle tables. A 98 per cent recovery of the gold, silver and copper in the ore is being attained while the recovery of tungsten is topping 80 per cent.

Due to the inaccessibility of the location and remoteness from any electric power a 200 kw. General Motors diesel off-the-line generator set powers the plant. The mill at present is operating on an eight-hour shift with 30 to 35 tons of ore processed daily. The plant has a potential capacity, however, of 100 tons per day. Drilling and mucking machines in the mine are operated by a 365 cfm. compressor driven by a General Motors Series 71 diesel engine. The compressor and the GM diesel were part of the equipment originally lifted to the shaft by cable.

In addition to Krom officers and directors of the project are J. F. Brand of Yakima, vice-president; George Wizer of Seattle, secretary-treasurer; Glen Griffith, Robert Lynch and William Weigand of Yakima and Richard Jungstrom of Kennewich, Washington. The mine was ready for operation last fall and some ore was mined, but weather conditions postponed real production until spring.

Operating drills and mucking machines in the Kromona mine is a 365 cfm. compressor driven by a four-cylinder General Motors Series 71 Diesel engine. These units were part of the equipment lifted to the mine shaft by cable.



Joe F. Krom, right, who located and founded the Kromona mine talks with Ray Johnson, representative of Evans Engine and Equipment Company of Seattle. The Evans Company assisted Krom in working out his mine power problems.

Western Zone Manager

Otto M. Abram

Otto M. Abram has been named western zone manager of the Aviation Division and Industrial Division of The Whitehead Company, Cleveland, Ohio. The announcement is made by L. J. Henderson, sales manager of the two divisions. Mr. Abram's appointment is the result of a reorganization of the Weatherhead sales divisions to provide more frequent contact and to make available an expanded engineering service program to all Weatherhead accounts on the west coast and in the Rocky Mountain area. Assisting Mr. Abram will be Robert J. Peterjohn, Aviation Division sales representative, and Russell E. Wolfe, representing the Industrial Division. Mr. Abram is a veteran of 19 years with Weatherhead, having joined the Company in 1935. His home is in North Hollywood, California.

New President

Nathaniel E. Duval

Mr. Nathaniel E. Duval, 40, New York City, former vice president and director of the Massachusetts Mohair Plush Co., Inc., has been made president of the Michiana Products Corporation, Michigan City, Indiana. Mr. Duval succeeds Otto M. Carry, Chicago, who is retiring after serving as Michiana's president for 25 years. Mr. Duval is a graduate of the University of Pennsylvania and Lowell Technological Institute. During World War II he was lieutenant commander in charge of research and development at the Navy's Air Material Center. Mr. Duval first became connected with Michiana when he was elected to the board of directors three years ago. Announcement of his appointment as president was made by Mr. Edward W. Crawford, secretary. Michiana, one of Michigan City's major industries, makes automotive and diesel equipment, high-alloy castings and heavy steel weldments.

Enlarges Factory Branch

Additions which have trebled the size of the Jacksonville factory branch of Electro-Motive Division of General Motors were formally opened recently. The plant, which rebuilds major components of diesel locomotives for railroads throughout the southeastern section of the United States, has been increased from 26,800 square feet to 77,568 square feet including an office building to which the Southeastern regional sales and service headquarters of the division have been moved. The expansion was made necessary by growth of the use of General Motors diesel motive power by Southeastern railroads. The Jacksonville plant is one of six such factories operated by Electro-Motive at strategic centers across the country. The others are located at Halethorpe, Md.; Robertson, Mo.; LaGrange, Ill.; Los Angeles and Emeryville, Calif. A seventh is under construction at Salt Lake City, Utah.

Railroad men from throughout the southeast and civic leaders of Jacksonville were guests at a luncheon, plant inspection and reception given by N. C. Dezendorf, vice president of General Motors and general manager of Electro-Motive Division, LaGrange, Ill., and his staff to mark the formal opening. The expanded activity was welcomed to Jacksonville by Mayor Haydon Burns. The Southern and Southwestern Railroad Club moved its monthly meeting from the regular place, Atlanta, to Jacksonville so its members could attend the opening.

Orders Seven Diesel Locomotives

Fairbanks, Morse & Co. has received an order for seven 2400 hp. Train Master diesel locomotives from the Jersey Central Lines. The amount of the order is approximately $1,700,000, and the locomotives will be built in the company's Beloit, Wisconsin plant. These locomotives were purchased especially for suburban commuter service in the New York metropolitan area. Longer passenger trains to be pulled by these locomotives on faster schedules will be placed in effect this spring for the railroad's mainline commuter service.

DIESEL TUG "CARPEAKE"

The 66-Foot Tug Powered By A GM Detroit Quad Diesel Packs a Lot of Power In A Small Package

A PRODUCT of the Equitable Equipment Company's Madisonville, La., shipyard the compact work boat *Carpeake* is of heavy all welded steel construction and carries a General Motors (Detroit Division) quad diesel engine. Maximum rating of the power plant is 800 hp. with nominal rating of 640 hp. at 1600 rpm. Reserve power is always available at short notice to meet emergencies, or to service an unusually heavy tow. Speed of the tug running light is about 11 mph.

The main engine has a 5 to 1 gear reduction and swings a Columbian manganese bronze motorship propeller having a 68 inch diameter and 48 inch pitch. Shafting is 5½ inch diameter forged steel to ABS specifications with bronze liners in way of Goodrich Cutless rubber stern bearing and Lucian Q. Moffett stuffing box. The main engine and the diesel auxiliary generator are arranged for keel cooling and split piping of ample area was installed on the hull to care for the water cooling requirements of these units.

Dimensions of the trim tug are 66 ft. length overall x 17 ft molded beam x 8 ft. molded depth and the hull has the customary tug boat sheer straight stem and elliptical stern. Illustrating the rugged construction, the keel and stem are 1 in. x 6 in. steel bar and the stern frame is 2 in. plate. The rudder is double plate, semi-balanced of streamlined design. Frames, fitted transversely are 4 x 3 x ¼ angles with 5/16 in. plate cant frames. The flanged floor plates are ¼ in. Hull plating is 5/16 in. throughout.

The new *Carpeake* representing a tug of special design is featured by a telescoping pilothouse which when raised will enable the tug's operator to see over light barges or deck barges piled high with cargo. It may be retracted to normal position for low-bridge operation. Hydraulically operated the movable unit may be elevated seven feet by means of controls at the pilot's elbow. For the operating crew the *Carpeake* carries six pipe berths with full bedding and has an additional built in bunk in the pilot house. Quarters and pilothouse are insulated with Fibreglass and sheathed with ¼ in. marine plywood and 26 gage aluminum plate. The pilothouse has balanced sash aluminum windows which were supplied by the Kearfott Company.

Equipment in the pilothouse includes a Vickers hydraulic steering system, Westinghouse pneumatic controls for main engine clutch and throttle, the lift controls for the pilot house itself, an RCA radiophone, an RCA radar set, and all necessary engine instruments and alarms. Atop the pilothouse is a 12 in. Carlisle & Finch searchlight which is controlled from inside the house. In the compact, well furnished galley which has a minimum of unused space, equipment includes a Webb Perfection oil burning galley range with a hot water back. The sink is a dual type with immersion booster heater element for bacteriological protection. Necessary cabinets, storage lockers, and dish rack are also incorporated. There is a mess table and four chairs for serving and an 8 cu. ft. Westinghouse refrigerator for perishable storage. On deck forward there is a manual capstan and aft an electric motor driven reversible power capstan having a 2000 lb. single line pull at 15 ft. per minute. Lifesaving equipment includes a lifeboat and davit installed atop the engine room and one 10 person life raft, two ring buoys, and a life preserver for each member of the crew.

Engine room auxiliaries include a 20 kw. 208/120 volt, 60 cycle a.c. generator set driven by a General Motors 271 diesel engine, an electrically driven Ingersoll-Rand fuel oil transfer pump, an electric motor driven Carter bilge and fire pump, two Burks electric pressure sets for water distribution throughout the vessel and, an electric air compressor. All piping and wiring are full marine equipment and installed in accordance with best practice and ABS rules.

One of the most practically equipped work boats on the waterways today for its size, the *Carpeake*, has been capturing attention wherever she docks and both owners and builders of the neat craft can be proud of the impression she is making. From the anchor davit at the bow to the hauser grating at the stern the boat is a credit to both designers and ship artisans.

Vice President of American Air Filter

Howard M. Fitch

Howard M. Fitch, general manager of the Herman Nelson Division, Moline, Ill., has been elected a vice president of American Air Filter Company, Inc., Louisville, Ky. Joining AAF as a sales engineer in June, 1936, Mr. Fitch served as production manager, manager of the legal and patent department, and assistant to the executive vice-president, before becoming manager of the Herman Nelson Division in 1953. He developed the Cycoil oil-bath air cleaner used on large stationary diesel engines. Born in Jeffersonville, Ind., he received the degree of Bachelor of Science in Mechanical Engineering from the University of Kentucky in 1930. He received his Bachelor of Laws degree from Jefferson School of Law (now University of Louisville) in 1942, and has been admitted to the bar in Kentucky, and to practice before the U. S. Patent Office.

Mr. Fitch is a member of the American, Kentucky and Louisville bar associations, the American Patent Law Association, the American Society of Mechanical Engineers, the American Society of Heating and Ventilating Engineers, the Society of American Military Engineers, the Kentucky Society of Profesional Engineers, the Society for the Advancement of Management, the American Management Association, the Moline (Ill.) Rotary Club, the Louisville Chamber of Commerce, the Honorable Order of Kentucky Colonels, and Phi Delta Theta fraternity.

Santa Fe Completely Dieselized

Santa Fe Railway, the first railroad in the nation to use diesel locomotives in all three branches of service—passenger, freight and switching—is now completely dieselized. Ever since Santa Fe acquired its first diesel locomotive in 1936, the company has been among the leaders in the use of this type of power, and announcement by president Fred G. Gurley makes the railroad the largest in the nation with a completely dieselized operation.

First diesel on the Santa Fe was a 600-horsepower switcher which went into service in the Chicago yards in 1935. Also in 1935, Santa Fe tested its first passenger diesel (two units totaling 3,600 horsepower) and placed it in service on the "Super Chief" between Chicago and Los Angeles in 1936 on a schedule of 39 hours and 45 minutes. Today's passenger diesels for the most part are three and four units totaling 6000 horsepower.

The road now owns 977 diesel locomotives totaling 1,622 units with a total of 2,263,210 horsepower. Included in the engine fleet are 90 passenger locomotives totaling 245 units, 552 freight locomotives totaling 1,040 units and 335 switching locomotives totaling 337 units. Service and maintenance of the diesels is carried on at huge shops located in Barstow and San Bernardino, Calif., Cleburne, Texas, and Argentine, Kansas, where the newest shop building on the system is in process of completion.

YOU TOO CAN USE HEAVY FUEL

The Third of a Series of Articles on the Successful Use of Heavy Fuel in Diesel Engines. These Comments Cover European Experience in the Use of Heavy Fuel.

JOHN Lamb, English engineer, first removed from boiler oil the objectionable matter not found in diesel fuel, then adjusted the engine to burn oil which differed from diesel fuel only in viscosity. Today more than 500 motorships, fitted with purifier-clarifier equipment, can burn boiler oil instead of the more costly diesel fuel. A decade ago—in fact, as late as 1946—there were no commercial motorships successfully burning boiler oil. It is no exaggeration, therefore, to say that the work of the English engineer, John Lamb, that made this progress possible is one of the most significant advances ever made in the world of dieselized vessels. Mr. Lamb's experiments, culminating in the successful results obtained on board the motor tanker *Auricula*, proved conclusively that boiler oil could be burned in diesel engines with very considerable savings, provided that this boiler oil was prepared for burning by proper centrifuging.

First, what is boiler oil and how does it differ from diesel fuel? Boiler oil is low-grade oil with viscosities up to 6,000 secs. R.I. such as is burned under boilers of steam-powered vessels. Most boiler oils are refinery residual oils. Whereas diesel fuel oils, which are distillates, are quite uniform as to characteristics, four different samples of boiler fuel may have specific gravities of 0.94, 0.96, 0.98 and 0.99 respectively. Viscosities of these same four samples of boiler oils may range all the way from 430 to 6,400 seconds (Redwood I at 100°F), and ash content may run from .05% to .09% or even more. In diesel fuel oil the ash very seldom amounts to more than 0.02%.

It is these 500 to 900 or more parts of earthy matter or inorganic ash per million parts of oil that are objectionable. Every other particle of residual oil will burn at temperatures well below 3,000°F, which is approximately the temperature in the cylinders of diesel engines, once ignition has taken place. This ash is composed of silica, iron oxide, vanadium oxide and other abrasive matter, which have no calorific value. These abrasives are very difficult to separate from the boiler oil because of their minute size and the high viscosity and specific gravity of the oil.

Before Mr. Lamb's experiments, it was felt that while marine diesel engines would start and work up to full rated power on any liquid fuel that could satisfactorily be handled by the injection pumps, prolonged operation such as is required for ship propulsion was impossible. The reason for this point of view was that after a comparatively short time in operation, carbon would form on the fuel valve nozzles and eventually interfere with the proper spraying of the fuel, thereby reducing the power output and causing the parts surrounding the burning fuel to become overheated. The state of incomplete combustion resulting would cause solid matter to accumulate in the cylinders, the piston rings to jam and blow and the exhaust valves, if the engine were of the four-cycle type, to require very frequent attention. In the case of two-cycle type engines liner wear would take place and the sulphurous gases blowing past the stuck piston rings would soon cause very serious mechanical trouble in the crankcase. Even if the grade of boiler fuel were sufficiently high to enable the ship to trade without serious mechanical trouble, the wear rate of cylinder liners and piston rings would be too great to justify continuing to use such fuel.

Various attempts had been made on and off for many years to find a means of overcoming these basic objections to boiler oil, but previous investigators all made one fundamental mistake—they treated the problem as a single problem instead of two distinct problems. Many engineers tried to centrifuge the boiler oil, for a centrifuge was an obvious means of throwing out the heavier solids and water from boiler fuel, but these earlier experimenters all tried, after a single centrifuging of the oil, to burn what remained by merely adjusting or altering those parts of the engine directly concerned with injection and combustion.

Mr. Lamb brought to the problem a fresh viewpoint. He was the first to recognize that the problem had *two* basic parts: (1) to remove from boiler fuel the objectionable matter not found in diesel fuel and (2) to adjust the engine to burn oil which differed from diesel fuel only in viscosity. As head of the Marine Research and Development Department of the Anglo-Saxon Petroleum Company, in cooperation with Messrs. R. & W. Hawthorn, Leslie & Co., Ltd., Newcastle-on-Tyne, he conducted a long and thorough series of experiments.

After carrying out a large number of experiments, Mr. Lamb determined that boiler fuel could successfully be burned in diesel engines when the oil was heated to 180°F, then passed successively through two centrifugals, the first a purifier, the second a clarifier. In the bowl of the purifier centrifugal force separated the water from the boiler fuel and continuously discharged it to waste. Simultaneously, the coarser particles of minerals present in high viscosity fuel, were discarded with the water.

The purified fuel, emitting from the top outlet of the two-discharge-outlet purifier, then passed to a one-discharge-outlet clarifier, where the last remaining particles of insoluble ash were thrown out. The quantity of solid matter extracted by the clarifier was small and the capacity of the dirt-holding space in the bowl so large in comparison, that bowl cleaning was required only at infrequent intervals.

The separation of finely divided ash particles from boiler fuel was a difficult one, calling for centrifuges with highest separating efficiency. (It is, for example, much more difficult than that required for the straight-forward purification of ordinary diesel fuel oil.) The De Laval Purifiers and Clarifiers used on this motorship service were high-capacity machines run at approximately half capacity. Their maintenance cost was low—always a desirable characteristic but especially so on a vessel at sea. They were equipped with bowls of especially high constant separating efficiency.

The use of two machines on boiler fuel service not only achieved maximum efficiency insofar as preparation of the fuel was concerned, but it allowed maximum flexibility, permitting the two stages of separation to be carried out at different temperatures where desired. This allowed each stage to be run under the best possible separating conditions.

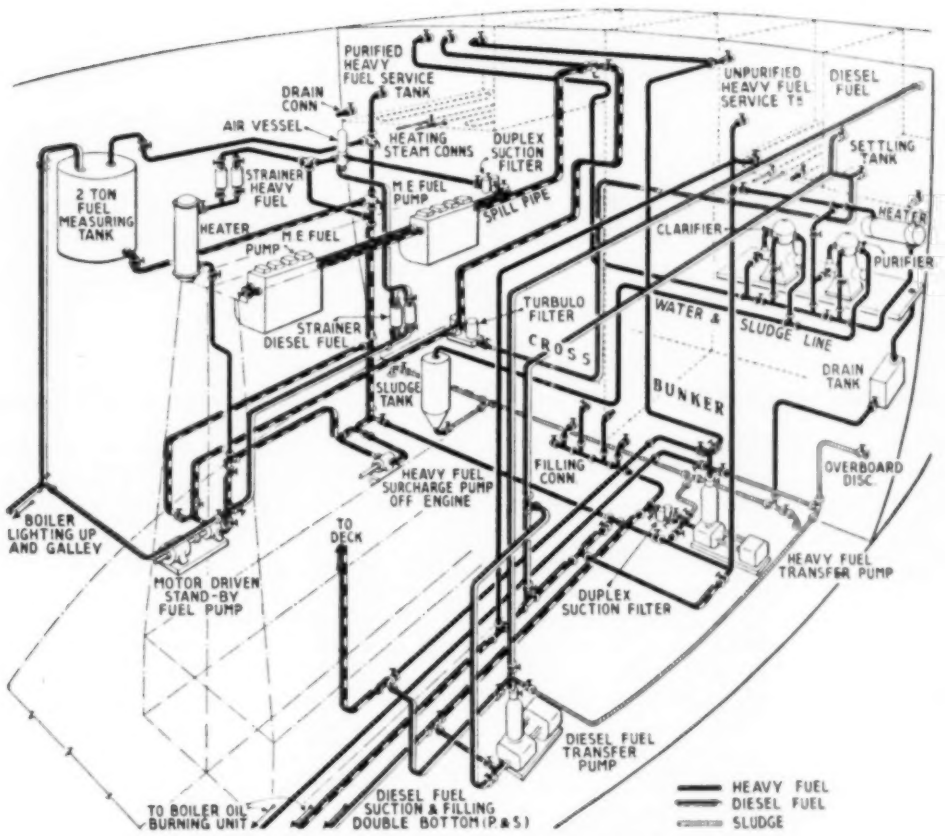
To sum up, Mr. Lamb's work showed conclusively that boiler oil could be burned successfully, effecting considerable reduction in fuel bills, without increase in engine maintenance and repair costs, provided that the oil was properly centrifuged first.

Tanker *Auricula* saves more than $170,000 in fuel costs in 5½ years . . . fuels used varied markedly in viscosity and other characteristics but cylinder wear was consistently little. When the motor tanker *Auricula* put into dock for hull repairs early last spring, after five and one half years of operation on boiler fuel, she had already saved $170,800 in fuel costs compared with what it would have cost to run on diesel fuel. Another major saving of $14,000 had been made, because when operating on boiler fuel the *Auricula* was dry-docked for maintenance only once a year, whereas on diesel fuel her owners would have docked her on a nine-month schedule.

This tanker of the Anglo-Saxon Petroleum Company (whose machinery was built by Messrs. R. & W. Hawthorn, Leslie & Co., Ltd.) has had a remarkable record of efficiency during these past five years or more. Up to the time that she was docked in April, she had covered a distance of 385,584 miles between pilot vessels. She had consumed 18,212 tons of fuel; the crankshaft had turned 213,000,000 revolutions and the engine had operated on full power on a fuel consumption of 13.16 tons per day.

There is nothing special about the diesel engine on the *Auricula*. It is a standard unit of the Werkspoor type, with under-piston supercharging. It has eight cylinders, 650 mm. in diameter; 1,400 mm. stroke; and the rating is 3,600 bhp., or 4,300 ihp. The vessel has a deadweight of 12,632 tons and ran consistently at a speed of about 12 knots.

Ever since the *Auricula* was first put into service in August, 1946, very accurate records have been kept of all phases of her operation. The most significant figures, of course, are those on cylinder liner wear, and these are given in the table•. A



Diagrammatic arrangement of the main engine fuel system in the *Auricula.**

chromium-plated cylinder liner was fitted in September, 1949, to No. 5 cylinder and at the same time a new standard cast-iron liner was placed in No. 4 cylinder and comparative observations were made. After running for 14,522 hours on full power it was ascertained that the maximum rate of wear in 1,000 hours was 0.14 mm. with the cast-iron liner and 0.026 mm. for a corresponding period with the chromium-plated liner. The rate of wear for the remaining cylinder liners is 0.10 mm. per 1,000 hours. Expressed another way, the rate of wear for cylinder liners 1, 2, 3, 6, 7 and 8 was 6/10,000 of an inch per 1,000,000 revolutions.

The *Auricula* has bunkered different commercial grades of boiler fuel at 56 bunkering ports in the eastern and western hemispheres. When the vessel was first placed on boiler fuel, oil having a viscosity between 1,200 and 1,500 seconds (Redwood I at 100°F) was bunkered. Subsequently, heavier grades were bunkered. During the past nine months, the average viscosity of the fuel used was 3,320 seconds (Redwood I at 100°F).

Two sets of fuel valve nozzles were used, one being fitted for fuels between 40 and 1,500 seconds, the other for fuels between 1,500 and 3,500 seconds viscosity. All of the nozzles had eight holes and with the 40-1,500 secs. fuels, the diameter of the holes was 0.85 mm.; for the heavier grades the diameter of the holes was 0.75 mm. After the nozzles and their needle valves had been used for 2,000 hours, they were sent to the makers for refitting. While it was the custom when using diesel fuel to maintain the fuel injection pressure at 4,000 psi., the pressure with the entire range of boiler fuels varied between 5,000 psi. and 7,200 psi.

The procedure for preparing boiler fuel for burning was, of course, the same as that already described. First the oil was heated to 180°F, the heaters being of the closed type to prevent the lighter constituents in the fuel from being driven off. Then the boiler fuel was passed through the first of two De Laval centrifugal machines. In the first stage, the boiler fuel was purified—that is, water and the maximum amount of solid matter (that which is comparatively easy to separate), were thrown out.

After purification the boiler fuel was exposed to centrifugal force once more in the bowl of the second machine. The clarifier extracted the remaining finely divided ash down to the lowest limits.

Cylinder Liner Wear for the Main Engine of the M.S. *Auricula**

Average output 4,120 ihp. at 112.4 rpm.

Cylin. Liner No.	Total hours at Full Power		Mean wear mm.	Maximum wear per 1000 hrs. mm.	Remarks
1	33,214	Top	3.39	0.10	Original Liner
		Middle	1.75		
		Bottom	1.37		
2	33,214	Top	3.02	0.09	Original Liner
		Middle	1.96		
		Bottom	1.95		
3	33,214	Top	3.29	0.09	Original Liner
		Middle	1.92		
		Bottom	1.92		
4	14,522	Top	2.10	0.14	Fitted in Sept. for experimental purposes
		Middle	1.19		
		Bottom	2.25		
5	14,522	Top	0.39	0.026	Chromium plated liner fitted in Sept. 1949 (to be regauged).
		Middle	0.41		
		Bottom	0.41		
6	33,214	Top			Original Liner (Not yet gauged).
		Middle			
		Bottom			
7	33,214	Top	3.59	0.10	Original Liner
		Middle	1.78		
		Bottom	1.63		
8	33,214	Top	3.49	0.10	Original Liner
		Middle	1.93		
		Bottom	1.75		

*from "The British Motor Ship."

WHAT'S GOING ON IN ENGLAND

CONDUCTED BY **HAMISH FERGUSON**

Hamish Ferguson received his training and early experience with the English Electric Company. Subsequently, he spent a number of years with a firm of diesel engine consultants, London, and in 1944 became secretary to the Diesel Engine Users Association. In 1953, he relinquished his appointment to devote his time to private consulting work connected with diesels and gas turbines.

BRYCE BERGER DEVELOPMENTS

BRYCE Berger, Ltd. of Ironbarks Works, Staines, have a well-established reputation as makers of precision equipment. Bryce fuel pumps and injectors are available to suit all engines from the largest to the smallest and, in addition, the Berger Handraulic Starter is in a class by itself. Research work is constantly being carried out in respect to these products and some account of their latest developments may be of interest.

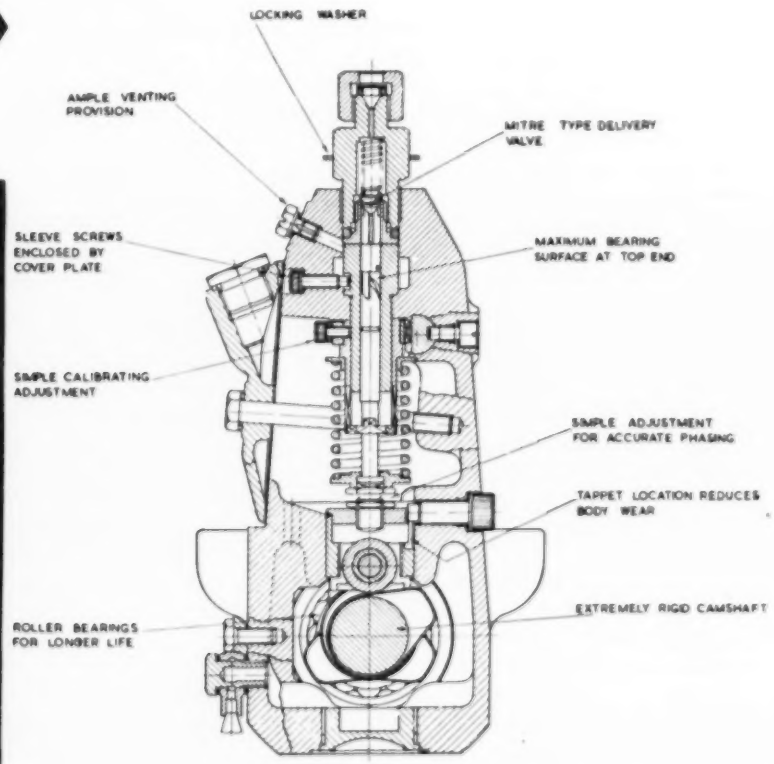
The Bryce Camshaft Pump has been designed to fill the need for a robust and simple unit for multi-cylinder engines requiring a single enclosed pump with integral camshaft in preference to individual pumps for each cylinder. The well proved features of the range of Bryce flange mounted pumps have been incorporated, whilst the additional components to complete the camshaft unit are of sound design and sturdy construction, resulting in a reliable unit providing the finest possible balance. Like the Bryce flange mounted pumps, which are fitted to the leading makes of industrial and marine engines, the new camshaft pumps operate on the constant stroke variable spill principle, utilizing a helix machined on the plunger head to give the required spill control. It is a feature of the Bryce plunger that the area of metal removed in the machining of the helical spill grove is held to the minimum that will permit the unrestricted passage of the spilled fuel, thus giving the maximum bearing surface to the pump plunger at this vital point.

The pump has been designed to give high performance with long life, and among the special design features are: Roller-type bearings. Extremely rigid camshaft, to avoid deflection and torsional vibration. Tappet location designed to overcome wear. Improved sealing against fuel leakage. Simple phasing and calibration adjustment.

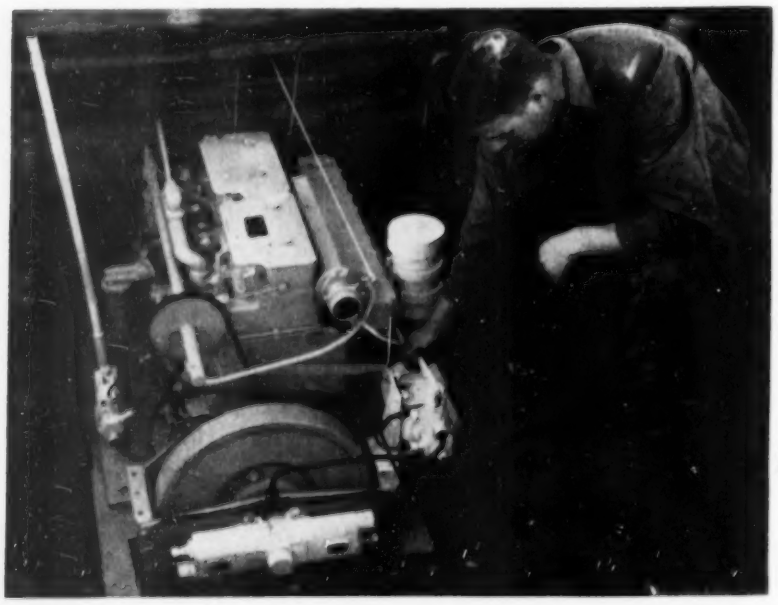
Hydraulic Governors. As an alternative to centrifugal governors of conventional design, the camshaft pumps can be fitted with the Bryce hydraulic governor, which has proved successful particularly in the automotive field. A new Bryce development is a very high performance hydraulic governor designed to control the Napier Delic engine and which has been adopted as standard equipment by the Admiralty.

Fuel Injection Nozzles. The overheating and consequent tendency to sticking of injector needle valves has become a problem mainly due to the fact that engine speeds have steadily increased as also has the power output per cylinder. Yet for reasons of design it has been a requirement that the overall size of the fuel injector shall remain the same. The difficulty can be overcome in most cases by water cooling of the nozzle tip and Bryce is one of the firms who have adopted this method as necessary. The new Bryce HL-T nozzle, however dispenses with cooling and relies upon mechanical design to ensure that the guided portion of the

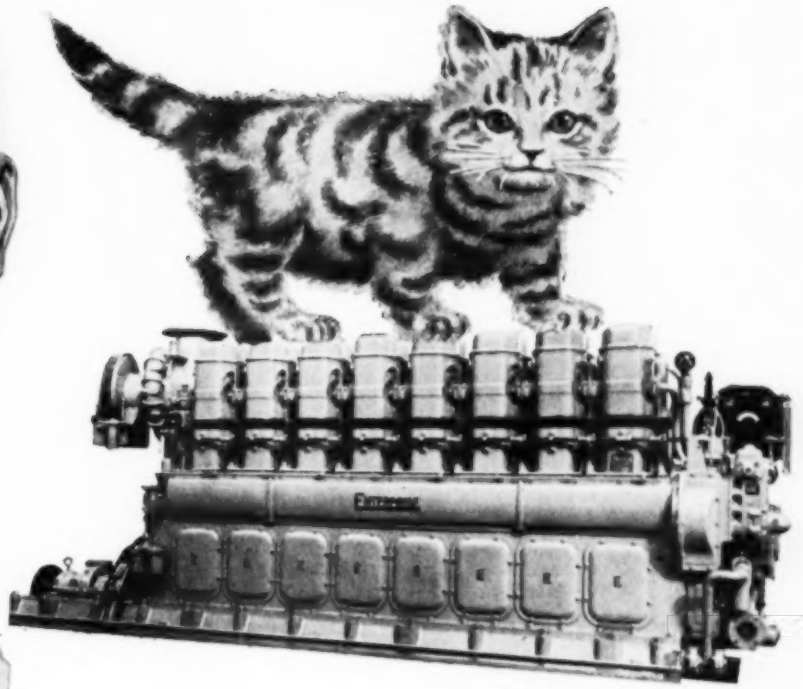
Cross-section drawing of Bryce camshaft fuel pump shows design features that give the unit high performance and long life.



A Petter B4M 4-cylinder marine diesel engine, showing Berger Handraulic starting equipment. The starter works within a closed circuit and has only three moving parts—two piston-racks and a pinion.



QUIET
as a kitten



ENTERPRISE has cut "Noise Level" to a minimum —all parts hum smoothly, wear longer

Enterprise has gone far in taking the head-splitting noise and damaging vibration out of diesel operation. From base to manifolds, ENTERPRISE Diesels are carefully engineered and constructed to overcome harmful vibrational effects and noise — without sacrificing any of the famous ENTERPRISE high performance features. By all comparison, the resulting smooth operation is "quiet as a kitten." A low noise and vibrational level means less wear, lower maintenance cost, higher overall efficiency and economy.

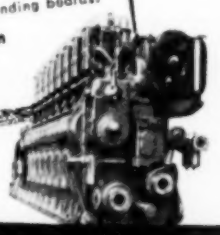
This is but another of the many plus values enjoyed by ENTERPRISE customers the world over. Get all the facts... and your choice, too, will be ENTERPRISE.

Write for descriptive bulletins, or call your nearest ENTERPRISE *Diesel Sales office.*

Check these points on Enterprise Quiet-Running Diesels

- Complete precision surface finishing of all moving parts to close tolerances permits accurate control of weights and balances, helps keep noise and wear to a minimum.
- Conservative speed ratings result in major reduction of noise.
- Carefully engineered injection system minimizes "injection knock."
- Base, block, gear case and cylinder heads are of heavy-sectioned cast iron, providing a maximum damping of internal noise.
- Water jacketed manifolds absorb exhaust noises.
- Modern design decreases flat external surfaces which act as sounding boards.

There is nothing finer in Heavy-Duty Diesels!



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needle is well away from the hot zone. The design achieves a larger diameter needle with increased seat diameter without any alteration to the external dimensions. On a strictly controlled test it is claimed that the service period of the injector between overhauls was increased from 200 hours to 1000 hours with the new type needle valve. This development is of particular benefit for use in dual-fuel engines where the amount of fuel required to be injected is so small that overheating of the nozzle tip is difficult to control.

Berger Handraulic Starter. Since reference was made to the Handraulic Starter in an earlier issue, considerable experience has been gained and these starters are giving satisfactory service in many parts of the world and operating over a wide range of temperature conditions.

As its name implies, the Berger Handraulic Starter is hand operated, the power being made available by a simple working combination of pneumatic and hydraulic principles. Working within a closed circuit, the starter relies on no outside source of energy and it has only three moving parts—two piston-racks and a pinion.

The Hydraulic accumulator consists of a cylinder tube in which a simple piston operates. The cylinder is filled with air compressed to approximately 2800 psi. and then sealed. As there can be no leakage and the air is not consumed, the accumulator never requires recharging with air. When air only is in the accumulator the piston rests at the base. Hydraulic fluid is pumped into the accumulator on the underside of the piston, which is lifted, the air above it being compressed to approximately 4,000 lbs./sq. in. The piston completely isolates the air from the fluid, and, the pressure being equal on both sides, it is subjected to no strain. The starter unit itself comprises two opposed cylinders, each containing a piston-rack which engages with a simple pinion. This pinion is integral with a toothed dog which engages with a corresponding dog on the engine crankshaft. Two spring loaded balls, one on either side of the starter dog, and running in helical grooves, insure a forward axial movement of the driving dog and thus effect the engagement of this dog with the engine half dog. The teeth of the pinion and racks, being helical, ensure that sufficient axial thrust is imparted to the driving dog to maintain solid engagement with the engine half dog during the impulsive stroke.

Building up the fluid pressure in the accumulator, which is not always necessary after every start, is normally carried out by means of the hand pump. This is easily operated and it takes no more than a minute or so to recharge the system. If desired, a small mechanical pump can be fitted so that, once the engine has started, the accumulator fluid pressure will be recharged automatically. The hand pump is, however, always available when required. An interesting feature of the device is that by holding the starting lever right open, the engine can be "inched" over as may be required for timing purposes, by operating the hand pump.

The efficiency of the starter is unaffected by temperature changes, and it is equally effective in very low or very high temperatures.

Florida Diesel News

By Ed Dennis

FLORIDA Georgia Tractor Co., Miami, delivered to R. & J. Emmons a Northwest dragline model 25 powered with a Murphy diesel model 11 rated at 100 hp. A similar dragline went to Andy's Truck Co. in Dade County for use in a rock pit.

FROM PORT Everglades to Miami with hi-octane gasoline the three new highway tankers of the Orange States Oil Co.'s fleet powered with Cummins model J. B. S. diesels rated at 150 hp.; from Cummins Diesel Engines of Florida.

MERCEDES-BENZ Distributors of Florida, Inc. have opened offices and show rooms in Miami for the Mercedes-Benz marine and industrial diesel engines. Jack Manson is the manager.

GIBBS OF JACKSONVILLE packaged the 67-ft. shrimpers *Eddie G* for Edward Gerkin of Fernandia Beach and the *Desco* of Fort Myers. Both are powered with D 13000 Caterpillar diesels, Snow Nabstedt 3:1 reduction gears.

EDWARD PARKINSON, president of Cummins Diesel Engines of Florida, announces Cummins diesel installations in Florida for the first three months in 1954 were: 22 in the Tampa area, 9 in the Jacksonville area and 18 in the Miami area. This included all diesel engines up to 600 hp.

FLORIDA Greyhound Bus Co. received 41 new 39-passenger model P. B. 4104 diesel buses, the city of St. Petersburg received 4 GMC T. D. H. 4512 45-passenger buses and Trailways Bus System got 15 GMCs. All are of the GM 71 series.

AN ATLAS diesel model 45 rated at 280 hp. at 750 rpm. on the newly launched *Mother Frances;* also in the engine room a 16-hp. Lister diesel auxiliary set.

TAMPA MARINE CO. recently launched the *Shrimp Queen* for A. A. Fagen of Tampa and the *Miss Claudia* for Guy Amason of Fort Myers. A model D 337 Caterpillar on the former and a 190-hp. Murphy diesel with a Hallett diesel generator set on the latter.

APPOINTED as resident manager of the Fort Myers branch of Diesel Engine Sales, St. Augustine, Kenneth Pacetti brings to his new position many years of experience associated with the dieselized fishing trawler industry.

KENNEDY MARINE Engine Co. of Biloxi, Mississippi, recently supplied the General Motors model 6-110 diesels for the 110-ft. menhaden fishing boat *Bill Walker.* Single screw installations were made on the *Elmer William II* and *Reub Junge* for the De Jean Packing Co.

DIESEL BRIEFS: A Fairbanks-Morse model 49½ A diesel in the *Jerome C. Clark,* a 1200 bbl. oil tanker . . . A G.M. 40 71-A rated at 110 hp. in the *Frisco* at Gulfport . . . And a 360-hp. Wolvezine on the *Douglas Mosher.*

Land Preparation

Partners Joe Scagliotti and Andy Christiansen operating HD-9 diesel tractors on their 175 acre sugar beet farm.

When it's depth the farmer requires in land preparation operations, many times it's the dieselized crawler tractor that he turns to, just as did Joe Scagliotti and Andy Christiansen of San Juan Bautista, California. These two men each own an Allis-Chalmers HD-9 dieselized crawler tractor. They are partners in a 175 acre sugar beet farm and use the HD-20, equipped with the 600 Tool Carrier to chisel for spring planting of sugar beets.

They go to a 20-inch depth on the first pass and then on the crossway run for the second pass, as deep as 24 to 26 inches. The power of the HD-9 makes this deep chiseling of the acreage a relatively simple and time-saving operation. Later an HD-5 diesel crawler tractor is used for listing.

President of National Supply

Arthur M. McKinney

Arthur W. McKinney, who is one of the most widely known men in the oil field supply industry, has been elected president of The National Supply Company, one of the world's largest manufacturers and distributors of oil field machinery and equipment. Mr. McKinney, who started with the company as a salesman in 1920, has served as executive vice president since 1948. He was elected to the presidency at a meeting of the board of directors in Pittsburgh on April 23, 1954. In his new position, Mr. McKinney succeeds Alexander E. Walker, who relinquished the presidency. At the meeting, Mr. Walker was re-elected chairman of the board and chief executive officer.

Born at Olean, N. Y., Mr. McKinney is a graduate of Allegheny College, Meadville, Pa., in the class of 1918, and served as a lieutenant in the U. S. Signal Corps during World War I. Starting with National Supply following his discharge from the Army, he quickly demonstrated a native ability to make friends and to sell the machinery and equipment used in drilling wells and producing oil.

He won promotion to assistant manager of sales in 1929, manager of sales in 1934, general manager of sales in 1938, and vice president and general manager of sales in 1940. In his capacity as executive vice president, Mr. McKinney spent much of his time away from his Pittsburgh headquarters, checking the company's sales operations in the field and also calling on many of the customers whom he numbered as personal friends. Even with the increased responsibilities of the presidency, he is expected to devote as much time as possible to maintaining these friendships.

Mr. McKinney is serving his second term as president of the Diesel Engine Manufacturers Association. He is a former president of the Petroleum Equipment Suppliers Association. In addition to serving as a director of The National Supply Co., he is a director of Oil Well Engineering Co., Ltd., an English firm that is half-owned by National Supply. He is director of the Ohio Citizen Trust Co., Toledo.

Promoted

W. P. Durbin

Promotion of W. P. Durbin to advertising manager of Electro-Motive Division of General Motors is announced by Volney B. Fowler, director of public relations. Mr. Durbin, assistant advertising manager since 1950, was born in Anderson, Ind. He received a B.S. degree in mechanical engineering from Purdue University in 1924 and joined Remy Electric Division of General Motors at Anderson as a draftsman. In 1925, he joined the Link Belt Company in Indianapolis, Ind. and after holding positions in drafting, cost estimating, tool designing, advertising and sales engineering with both Link Belt and General American Transportation Corporation in Chicago, Mr. Durbin joined Electro-Motive in 1937 as an engineering estimator.

He became a supervisor in the planning department later the same year. In 1938, he was transferred to the service department as supervisor of repair and rebuild costs. He became office manager and manager of the delivery section prior to joining the purchasing department in 1944 as group buyer for non-current parts. In 1949, he became administrative assistant to the director of production control and purchasing and went to the public relations department as assistant advertising manager a year later.

Appointed Manager

Arthur E. Slaasted

F. M. Young, president, Young Radiator Company, Racine, Wisconsin, has announced the recent appointment of Arthur E. Slaasted as advertising and sales promotion manager. Before joining Young Radiator, Mr. Slaasted was advertising coordinator of power and electronic equipment, Allis-Chalmers Mfg. Co., Milwaukee. He also served Lindemann & Hoverson Co., Milwaukee, as assistant advertising manager and has had previous experience in retail promotion. He is active in the Racine Advertising Club and is Public Relations officer of American Legion Post #310.

Application of Electric Plants Described

How Onan electric generating plants are used in many different applications is told in Volume 10, No. 2 of the company's publication, "Power Points Digest." Six interesting installations are pictured and described in the pocket-sized, 12-page booklet.

Featured prominently is the unusual floating concrete plant, used in building pier foundations for the new Tappan Zee Bridge which spans the Hudson River between South Nyack and Tarrytown, New York. How the 5 kw. electric plant provides essential power for motors that drive the cement batcher for cement bin signals, batching meters, pumpcrete signals, and ship-to-shore radio telephone is told in an interesting double-page spread. Onan emergency plants proved equal to the occasion during power outages on Long Island, N. Y. and in Rivera Beach, Florida. Brief stories on these two standby installations are told. A unique mobile information center, used by the Hercules Powder Company, is described along with an unusual, glass-faced trailer operated by the D-Con Company to demonstrate their rodent control products. Also described is the Onan-powered reflectoscope, a remarkable instrument that detects flaws in railroad rails and switch points that are not visible to the naked eye. "Power Points Digest" is available, without charge, from D. W. Onan & Sons Inc., Minneapolis Minn. Ask for Volume 10, Number 2.

Division Completely Dieselized

A fifth Great Northern Railway operating division has been completely dieselized. It is the 1,422-mile Butte division, headquartering in Great Falls, Mont. The mileage is in Montana chiefly and also extends into western North Dakota. Diesel-electric locomotives now move all trains and do all switching in the territory between Williston, N.D. and the Pacific Coast. This embraces 3,770 miles of the 8,300-mile Great Northern system. On the four eastern divisions, in Minnesota, North Dakota, South Dakota, Iowa and Wisconsin, both diesel-electrics and steam locomotives are in use. In this territory, diesels handle all passenger trains and most of the freight trains and switching.

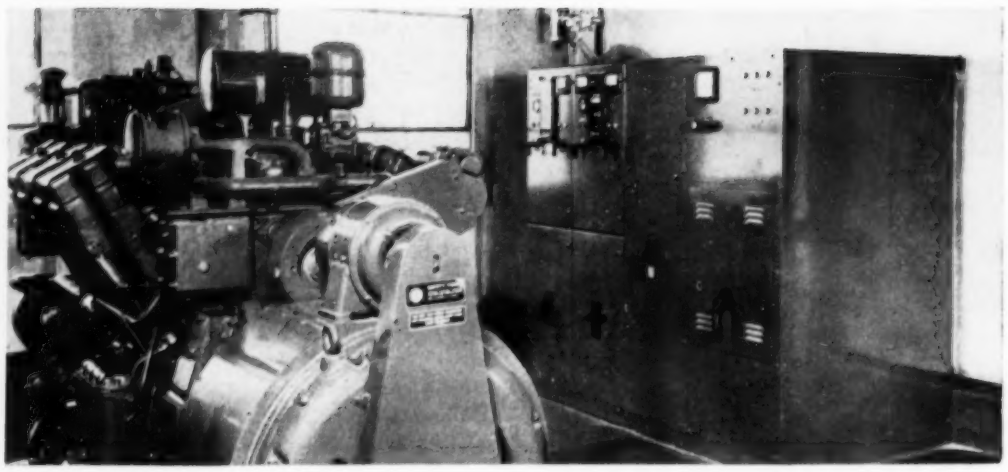
Control for Diesel Generator Sets

TODAY there is a large and expanding market for diesel generator sets. In construction, mining, for stand by power in places where a constant source of electrical power is vital are a few of the areas where the use of the diesel generator set has become widespread. These sets need control panels, distribution units and switch-gear.

Out of this need for control equipment for diesel generator sets and their accessory equipment has grown a company of engineering specialists. They are specialists because the design and manufacture of electrical control equipment requires custom engineering for many individual and varied applications.

Electric Service Engineering Company of Joliet, Illinois, better known as Esco, is a concern which concentrates in engineering for individual problems. Working from job specifications and customer preferences, Esco engineers design and build control panels, distribution units and switch-gear. This equipment, engineered for a specific need and match-designed to space limitations, offers control for many varying conditions.

Esco was established in 1912 to manufacture electrical equipment with emphasis on custom engineered work. After steady expansion caused Esco to outgrow several plants in the Chicago area, the present factory was acquired in Joliet in 1950. This facility more than doubled Esco's manufacturing capacity, and several additions have since been built. Although the majority of Esco's products are individually engineered to meet specific customer needs, there are facilities in the more than 100,000 square feet of floor space to manufacture a single type of unit by long run high production methods after initial shake-down testing. For example, Esco is building a number of mobile electrical distribution systems for starting and servicing military jet aircraft. These portable trailer-mounted units are being produced in volume at two Esco factories. The power for the units is furnished by a mobile diesel engine generator set controlled by Esco equipment. Thus, here is another illustration in the growth of the diesel industry; the adaptation of a supplier of custom engineered products to high production methods in meeting the demands of the diesel market.



This pumping station of the Michigan Gas Storage Co. is protected by standby diesel electric sets with Esco-engineered controls, for automatic engine starting, voltage regulation and general synchronization.

Esco products for the diesel industry include: synchronizing units, automatic start-stop controls for diesels, visible and audible gauge and alarm panels, control and relay panels, generator and feeder control units, and switchboards as well as voltage regulators.

For further information write to Electric Service Engineering Co., 10 Third Avenue, Joliet, Illinois.

Gulf Coast Diesel News

By Michael T. Pate

STEEL Tank Construction Company, Houston, has secured through Mustang Tractor & Equipment Company, Houston, three model D-126 Caterpillar diesel electric generating sets, each delivering 90 kw. at 1800 rpm. The diesels, rated at 159 hp., will furnish power for driving such auxiliaries as air compressors and welding equipment in the company's plant. Each unit is self-contained, including radiator and 90-gallon fuel pump.

KERR-McGEE Oil Industries, Inc., Oklahoma City, Oklahoma, has bought from Stewart & Stevenson Services, Inc., Houston, three General Motors series 110, 200 hp. diesels. Each will be used to repower a 100 kw. generating set on the company's offshore drilling equipment.

LIGHTHOUSE, Inc., Houston, Texas, has bought from Buda Engine & Equipment Company, Houston, eight Buda 2-cylinder, 15 hp., automatic signalling units. These diesel units will be installed in pairs on offshore drilling and producing platforms for 30-day unattended service, where they will power lighting and warning devices. Automatic controls are such that the stand-by unit will cut in immediately in case of failure or stoppage of the one carrying the load.

MARINE Construction Company, Patterson, Louisiana, has secured through Stewart & Stevenson Services, Inc., a General Motors series 110, diesel marine propulsion unit, rated at 200 hp. The unit will be used to repower, through 4.5:1 reduction and reversing gear, a 70-foot steel deep-sea trawler.

GUS LEE, Blessing, Texas, has bought from Mustang Tractor & Equipment Company, Houston a model D-13000 Caterpillar diesel, rated at 151 hp., which he will use on a deep-well pump rated at 2200 gpm.

LIBERTY Fish & Oyster Company, Galveston, Texas, has bought from Stewart & Stevenson Services, Inc., a General Motors series 71 diesel marine propulsion unit complete with 3:1 hydraulic reduction and reversing gear. The diesel, rated at 165 hp., will be used to repower a 60-foot shrimp trawler.

FARNSWORTH & Chambers, general contractors of Houston, have bought through Mustang Tractor & Equipment Company, Houston, a Caterpillar diesel model D-315, 30kw. electric generating set for single phase, 60-cycle current which will be used as power source for electrically driven vibrators on concrete construction.

L. H. HOLLINGSWORTH, Houston, will repower the 35-foot shrimp trawler *Joe M. Senior* with a General Motors series 51, marine diesel propulsion unit delivering 80 hp. through a 2.5:1 reduction gear. The unit was delivered by Stewart & Stevenson Services, Inc., of Houston.

Caterpillar Officers

Louis B. Neumiller

Harmon S. Eberhard

Louis B. Neumiller was elected chairman of the board of Caterpillar Tractor Co. at a meeting of the board held recently at the company's corporate office in San Leandro, California. Harmon S. Eberhard was elected president to succeed Mr. Neumiller, who has been Caterpillar's president for the past twelve years. Harry H. Fair, who resigned the board chairmanship at this meeting, will continue as a director. Mr. Fair has been closely associated with the tractor business since 1918, and was the prime mover in the formation of Caterpillar Tractor Co. in 1925. At the same meeting, the board voted to discontinue the executive committee, whose chairman, former president B. C. Heacock, is retiring from operations at this time but will continue as a director. All other incumbent corporate officers were re-elected.

The election of Louis B. Neumiller as the new chairman of the board comes as a culmination of a lifelong experience with the company. A native Peorian and son of an immigrant blacksmith-wheelwright, he entered the employ of the company in Peoria as a stenographer-clerk in 1915.

Brazil to Convert Tanker Fleet

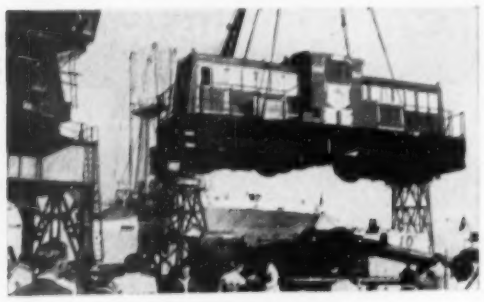
The Brazilian government has contracted with Diesel Economy Devices, Inc. of New York for the conversion of its tanker fleet of 12 dieselized vessels to burn low-cost, low-grade, universally obtainable Bunker C type boiler fuel oils. It is expected that Brazil will save up to 50% of its fuel bill for operation of the ships.

Orders have been placed for the necessary machinery and equipment for this contract, and special engineering and fabrication of sub-assemblies of the complete fuel conversion units and controls is expected to be ready for shipment within 90 days. Actual installation on the vessels will be made at ports of call and will be finished, tested and the ships ready to get under way in no more than four or five days.

Upon completion of this contract Diesel Economy Devices, Inc. will begin work on another similar contract in South America involving the conversion of stationary power plants. The new project will involve an expenditure of around $6,000,000.

The company plans to concentrate future attention on the domestic market where many diesel ships and most of over 2,000 stationary dieselized power plants are capable of being converted to a system using cheap fuel oil.

Locomotive for South America



Ready to go into immediate operation is this 65-ton Baldwin-Westinghouse industrial diesel-electric locomotive being unloaded from the S. S. *Robin Doncaster* in Durban, South Africa. Built by Baldwin-Lima-Hamilton Corp., Philadelphia, Pa., for the Standard Vacuum Oil Company, the 400-horsepower switching unit's initial job is to help Foster Wheeler Corp. construct Standard Vacuum's new refinery at Durban. Known internationally for more than a century, the Baldwin name can be found on many powerful diesel electrics operating throughout Africa. Within recent years Baldwin has delivered 93 diesel locomotives to French North Africa, 64 of them going to Algiers, 25 to Morocco and four to Tunisia. Nine of those shipped to Morocco were fitted with special "sand proofing" equipment for desert operation.

Special Assistant

George V. Dutney

The appointment of Mr. George V. Dutney as special assistant to the president is announced by Mr. Robert E. Friend, president, Nordberg Manufacturing Company, Milwaukee, Wisconsin. Mr. Dutney will make his headquarters in the company's New York office. A native of Pittsburgh, Pennsylvania, Mr. Dutney graduated from Cornell University in 1910 as a mechanical engineer. He was associated with Jones & Laughlin Steel Company in various capacities until 1920, as assistant steam power engineer, assistant superintendent cold rolling and cold drawing and superintendent, plate and structural mill.

A Captain during the First World War, he was attached to the French Artillery and became an instructor in that arm. After the Armistice, he was appointed to General McKinstry's staff as technical advisor to Colonel House on the commission to negotiate peace. He spent eight months in Rome and Paris in charge of the section which figured the financial and economic losses suffered by the steel industry in the devastated areas of Italy and France. That brought him into intimate contacts with the Peace Commission. He returned to Jones & Laughlin after this experience.

Mr. Dutney became associated with Johns-Manville on their Pittsburgh Management Staff in 1920 and later was in their Management in Cleveland, Ohio and in New York City. In 1929 he became a partner in Rankin-Dutney Corporation who handled Johns-Manville contract and warehouse activity in Cleveland, Detroit, Pittsburgh and Cincinnati, acting as Executive Vice President and Sales Manager. This company sold their interest to Johns-Manville in 1935 and he returned to their Management in Philadelphia where he remained for seven years.

"Servicing the Series 71 Cylinder"

A new strip film with sound, entitled "Servicing the Series '71' Cylinder" has been released by the Service Department of the Detroit Diesel Engine Division of General Motors. The film, obtainable from Detroit Diesel Distributors and Dealers, covers inspection procedures to be followed in determining the re-usability of cylinder parts during engine overhaul and the step by step processing needed to restore such parts to factory-set standards.

Although the information featured already appears in the Division's service manuals and other literature, it is here brought together to present an effective graphic training aid for mechanics in the Division's service outlets and for contractors and fleet operators maintaining their own facilities.

BIGGER, BETTER, completely revised, re-written and brought up to date, DIESEL ENGINE CATALOG, Volume Nineteen, is now on the press. New sections have been added, new engines illustrated and described. This 450-page book measures 10½ by 13½ inches. First mailings will start June 25. Advance orders are now being accepted. $10 postpaid plus California sales tax where applicable. Send checks to DIESEL PROGRESS, Colo Station, Los Angeles 46, California.

Produces 50,000th PSB Pump

Donald P. Hess, American Bosch president (right) inspects 50,000th PSB fuel injection pump held by Walter McAllister, vice president of manufacturing.

A milestone in the progress of the diesel was reached recently as American Bosch Corporation announced it had passed the 50,000 mark in the production of its PSB distributor type, single-plunger fuel injection pump, which was introduced to the diesel industry just several years ago. The production of 50,000 of any one type of multi-cylinder pump in this short space of time is exceptional in the diesel fuel injection business. But when the pump is of a new and radically different type, then this production record becomes a real achievement. The fact takes on added significance when it is realized that the American Bosch PSB has been responsible to a great extent for the expanding use of the smaller, lower-priced automotive type diesel engine.

The PSB pump was developed by American Bosch to fill the need for a simplified, lower cost injection system for the diesel industry. It is a small pump with about half as many parts as the standard multi-cylinder pump which has been serving the diesel industry since the early days of the diesel. To American Bosch, the development of this entirely different type of fuel injection pump was distinctly a pioneering effort. There wasn't an order on the books or an engine developed to take such a system when the people of American Bosch undertook the project. But it stands as an excellent example of how a manufacturer of equipment, through foresight and initiative and close customer relationship, can contribute to end use product which will swing wide the doors to new markets.

The new pump was placed in production late in 1949. It had a single delivery valve and a single plunger which not only pumped the fuel, but also rotated to serve as a fuel distributor to the engine's four or six cylinders. Yet, it retained the precision characteristics and effective speed control necessary for top engine performance. American Bosch called it the PSB. It was about half the size and weight and had approximately half as many parts as the commonly-used multi-plunger pump and it could be mass-produced at far less cost. American Bosch spent well over a million dollars in engineering development and tooling expense to provide this pump for the diesel industry. Its perfection now meant that diesel engine manufacturers could produce small, more economically priced engines and still have a precision-built injection system.

New markets have been created for the diesel as a result. The farm tractor market has been thrown wide open to diesels and thousands of small dieselized tractors are now serving farmers both here and abroad. Diesels equipped with the American Bosch PSB are used in electric generating sets and other industrial and marine applications.

Purchases New 1765 Hp. Diesel

Purchase of a new diesel power unit that doubles power capacity of the present five units in its power plant, is announced by the village of Bethel, Ohio, 30 miles southeast of Cincinnati. The order has been placed for a 1765-hp. Superior diesel engine with the Engine Division of The National Supply Company, Springfield, Ohio. The new power unit is expected to be in service before the end of the year. The new diesel is a Model 65 supercharged, 4-cycle, 8-cylinder engine with 12-¾-in. bore and 15-in. stroke, having a running speed of 600 rpm. It will drive an Elliott generator of 1250 kw. capacity.

To make room for the new power unit the original two diesel power units, installed in 1928 and having a combined power output of 185 kw, will be removed and a new foundation built. This will leave the plant with three units totaling 1050 kw capacity to be increased to 2300 kw. The new engine will be capable of carrying the whole increasing power load of the plant. Two Superior engines will comprise three-fourths of the power capacity of the plant's four diesel units.

Mid-Continent Diesel News

By Jack F. Cozier

OKLAHOMA-Mississippi River Products Line, Inc. has purchased six Cooper-Bessemer gas-diesel engines (five JS-6-GD units and one JS-6-SGD) to drive Bingham centrifugal pumps through Falk speed increaser gears. The units will be placed near Conway, Arkansas and Wynnewood, Sunary, and Allen, Oklahoma on the 378-mile-long 12-inch line that reaches from Duncan, Oklahoma to West Memphis, Arkansas. Installed on the units are Woodward PG governors and DeLaval hydraulic radiator drives.

THE LE ROI CO., Tulsa, Oklahoma headquarters, announced that they are expanding their present facilities by 2½ times in the greater Tulsa industrial area. The new building will contain offices, warehousing, a parts department and shops, with room for future expansion on a five-acre site.

SUNRAY OIL CO. purchased a Koehring model 405, one cubic yard clam shell machine, powered by a GM 471 engine to be used for handling petroleum coke near Duncan, Oklahoma.

FIVE Cooper-Bessemer gas engine compressors, model GMXA-8, were sold to be used in the Little Beaver field in Colorado. The units will be skidded by Stearns-Roger of Denver, Colorado, and will be equipped with Woodward governors.

ONE OF THE main features of the field day held recently at Roland Stanfield's ranch near Tulsa, Oklahoma, was a GM model 6-71 engine powering a six-inch Marlow centrifugal pump on a sprinkler irrigation system covering 280 acres. The unit features Murphy safety controls on the pump and the lines.

AMERICAN Zinc Co., Dumas, Texas, purchased a Koehring model 304, ¾ cubic yard clam shell machine, powered by a Buda model K-428 unit.

PRODUCERS Chemical Co., Borger, Texas, purchased two GM units model 6031C from Diesel Power, Inc., Plainview, Texas, to be used on hydrofracture units.

SIXTEEN HP-326 Buda natural gas engines were sold for pipeline service in the mid-continent area by the Buda Engine and Equipment Co., Tulsa.

COMANCHE Natural Gas Co., Comanche, Oklahoma, purchased two Le Roi L-3000 diesel power units. The units will be used to power Gardner-Denver gas compressors in a booster station.

BUDA Engine and Equipment Co., Tulsa, Oklahoma, announces the sale of three 8M0-1290 Buda natural gas engines for water-flood project service in the mid-continent area.

ONE MODEL PC-2505/125 kw. Buda natural gas generating set was sold for generating power in a gasoline plant in the mid-continent area by Buda Engine and Equipment Co.

Trial Run

Kewaunee Engineering has announced that their first L.C.U. (Landing Craft, Utility) passed the Navy preliminary acceptance trials held on Lake Michigan, April 1st with excellent rating. The first of 27 such craft now under construction at the Kewaunee Yard, she measures 115 ft. in length with a beam of 34 ft., is powered with three Gray Marine diesels, Model 64YTL3, 225 hp. at 2100 rpm. and is triple screw and triple ruddered. The L.C.U. carries a crew of 14.

The Navy Trial Board consisted of the following members: From Chicago Supervisor of Shipbuilding—Lcdr. J. R. Stanger, Lt. (j.g.) R. H. Bormann, Lt. (j.g.) W. H. Blanck, Jr., Lt. (j.g.) R. P. Poyner, C.P.O. McKenney; Bureau of Ships Representatives—Mr. J. Haas and Mr. E. Conway; Sturgeon Bay Resident Supervisor of Shipbuilding—Cdr. E. A. Anderson and Lcdr. G. S. Cummins; Resident Supervisor of Shipbuilding, Kewaunee—Lt. J. B. Hartland; Navy Inspectors—Mr. Ray Sherry, Mr. John Haslam, Mr. Joe Brezinsky, Mr. E. Taylor, Mr. E. Kenley. Company representatives who presented the vessel to the Navy for trials are Mr. L. E. Maples, Mr. Ken Trakel, Mr. Robert C. Andress, Mr. C. K. Kay.

Kewaunee Engineering now employs a total of 450 men from Kewaunee and the surrounding area, bringing an annual payroll to the community of over one and one-half million dollars. In a recent survey and according to figures furnished by Werner Nelson, Industrial Relations Director for Peterson Builders of Sturgeon Bay and Kewaunee Engineering of Kewaunee, Wisconsin, the "outside dollar" such as Kewaunee Engineering Corporation brings to the community "passes hands seven times before leaving the community and is therefore the source of prosperity to a community such as ours."

Delivery of the L.C.U. will start this month and will be made under their own power with crews furnished by Kewaunee Engineering Corporation. Delivery will be made to Charleston, South Carolina, for final Navy acceptance.

Burnett Address Change

Burnett Machinery (Canada), main distributor and service agents for Merlin Servicemaster in the United States and Canada, reports a change of address to Box 85, O'Connor Drive Postal Station, Toronto 16, Canada. The former address was 168 King St., E., Toronto.

Worthington Diesels Shipped to Israel

Worthington diesel engines, pumps and gears being loaded aboard the *Henrietta Szold* in New York bound for Israel.

Two diesel engines, part of the first units of a $2,100,000 purchase of heavy-duty water pumping equipment from the Worthington Corporation of Harrison, New Jersey, were shipped recently from New York City for use in a major irrigation project in Israel. The first shipment included two complete units of centrifugal pumps, diesel engines and gears.

Oil and Gas Power Conference

The 26th Annual Conference and Exhibit of the Oil and Gas Power Division of ASME is scheduled this month, June 14-17 at the Muehlebach Hotel in Kansas City. A full program of meetings, presentation of technical papers and discussions has been planned. The program will be interspersed with exhibit inspection periods. The popularity of the exhibits has been very great during past Conferences and early indications are that the coming exhibitions will excite increased interest.

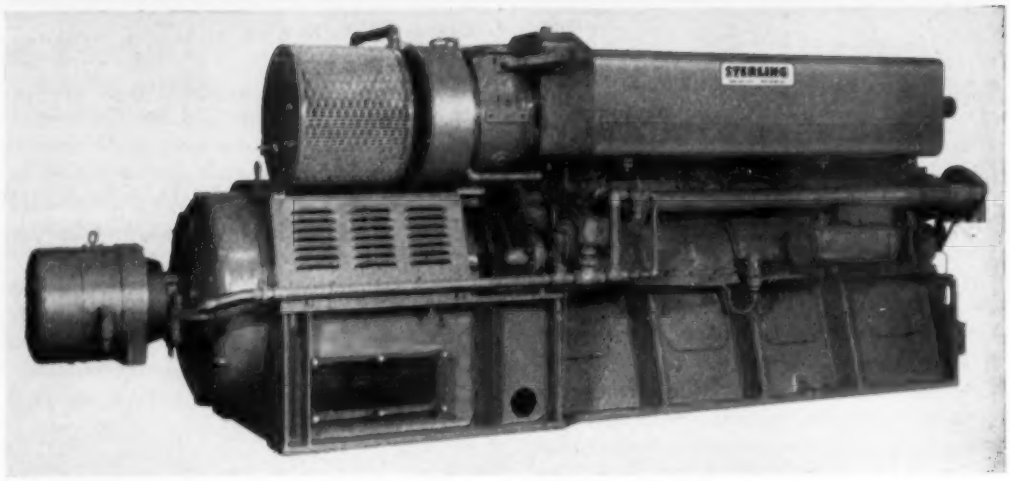
The Sterling Portable Emergency Unit Features Electric Machinery Generator

In the article in our May issue appearing on pages 46 and 47 we described a 600-kw. Sterling portable emergency unit. Unfortunately, we made a very serious error in crediting the generators used on this unit to Westinghouse. This was not a true statement. The generators used on all of the units so far built for the Bureau of Yards and Docks were supplied by the Electric Machinery Manufacturing Company, Minneapolis, Minnesota. Our sincere apologies are extended to Westinghouse for any embarrassment we might have caused them and certainly our apologies are extended to Electric Machinery Manufacturing Company. The Sterling Engine Company feels just as badly as we do about this regrettable error. Explanations of how it occurred won't help, but we do want to advise our readers of this correction.

Just after we went to press, the Sterling Engine Company asked us to make the following addition to the general text. At that time we could not do it, so here is that addition.

"Advancements in the field of electronics, aviation, guided missiles, radar, communication systems, etc., have definitely proven that use of electrical power is a vital part of these operations. The armed forces have been cognizant of this requirement and efforts were extended to produce a diesel engine driven generator set, with the least possible weight and overall physical dimensions.

A CIVIL DEFENSE INSTALLATION



Emergency unit has Electric Machinery Manufacturing Co. generator.

The main objective was to produce a large capacity self-contained unit that was complete with all requirements to be placed into operation with the minimum delay and still be transported by air cargo planes, trailer truck, railroad cars, or shipboard. Units produced up to this time, because of the weight and size, limited transportation either by railroad or shipboard.

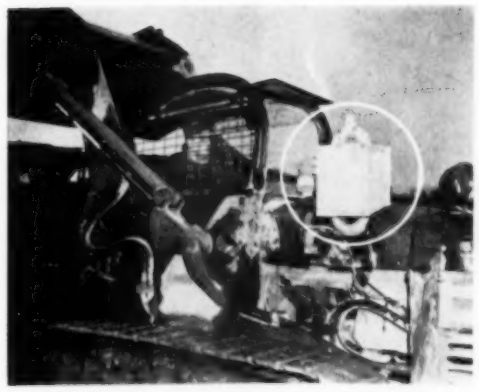
"The Bureau of Yards and Docks, Department of the Navy, prepared specifications, which included weight limitations, overall dimensions, and all equipment to provide a complete self-contained, independent power plant of 600-kw. capacity, suitable for transportation by plane and 25-ton standard low bed trailer truck. The Sterling Engine Company with their modern design, light weight, 8 cylinder, 8-in. bore, 9-in. stroke turbocharged engine operating at 1,200 rpm. was able to comply with the specifications. Working closely with the design engineers of the Bureau of Yards and Docks, Sterling produced a complete unit weighing 45,000 lbs. and meeting all the requirements of the specifications. Six of these units have been completed, tested to the rigid requirements of the specifications and shipped."

Device Tames Diesel Exhaust

A catalytic muffler that effectively reduces the noxious and irritating components of 4-cycle diesel engine exhausts has been developed by Oxy-Catalyst, Inc., Wayne, Pa. The new device, called the Dieseler, attaches directly to the engine exhaust manifold and burns by catalytic action the noxious carbon monoxide and odorous hydrocarbon fumes in exhaust gases. This catalytic process eliminates much of the heavy smoke and strong odor for which diesel trucks and buses are noted and, in industries such as mining, will permit more widespread use of 4-cycle diesel equipment underground or in enclosed plant areas.

In announcing that the Dieseler is now in production, Oxy-Catalyst revealed that the first model has been operating successfully for over three months in the limestone mine of the Coplay Cement Manufacturing Co. The new catalytic exhaust has permitted the Coplay, Pa. cement manufacturer to operate a standard dieselized tractor-shovel underground without danger from exhaust fumes. Broader applications are seen for the Dieseler on 4-cycle diesel trucks and buses, construction and materials handling equipment and stationary diesel engines. In such installations the Dieseler can greatly reduce and in most cases completely eliminate the annoyance factor of the exhaust of any 4-cycle diesel engine that operates fairly steadily at 60 percent of rated load or more.

Prototype Dieselers have been laboratory tested on diesel engines that have been loaded to simulate the work cycles of trucks, buses, tractors and locomotives. In all tests the Dieseler eliminated 65-85 percent of irritating hydrocarbons, 80-90 percent of carbon monoxide.



The Dieseler (circled) mounted on a dieselized International-Harvester tractor owned by the Coplay Cement Manufacturing Company. This new catalytic muffler makes possible safe underground mine operation of the diesel.

The Dieseler is the second exhaust to be developed by Oxy-Catalyst. The first, a catalytic muffler for engines running on unleaded gasoline, is now being used widely to reduce harmful contaminants in the exhausts of fork lift trucks and other plant vehicles that operate in enclosed or poorly ventilated areas. Both types of exhaust unit make use of oxidizing catalysts developed by Eugene J. Houdry, noted pioneer in the catalytic cracking of petroleum and now president of Oxy-Catalyst. They are the same catalysts, called Oxycats, that have been used for air pollution control and waste heat recovery in industrial stack installations at such plants as Sun Oil Company, Marcus Hook, Pa.; Radio Corporation of America, Camden, N. J., and Enamelstrip Corporation, Allentown, Pa. Oxy-Catalyst engineers are now working on a third exhaust for 2-cycle diesel engines.

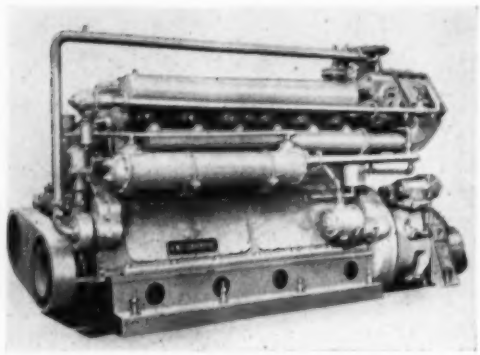
The Dieseler at Coplay is installed on a 62½ horsepower, 4-cycle International Lodover—a tractor-shovel. This unit formerly was operated outdoors but now can be used deep inside the mine to load blasted limestone ore on to shuttle trucks. Coplay reports that, even with continuous operation of the tractor-shovel, carbon monoxide exhaust concentrations have dropped below 0.003 percent. This is an elimination of about 90% of the carbon monoxide in the diesel engine exhaust and is well below the Bureau of Mines maximum atmospheric concentration of 0.01 percent for a safe eight-hour exposure.

The catalyst is doing just as thorough a job of cleaning up hydrocarbon fumes – the irritating, odor-causing components of diesel engine exhaust.

New "Power Parade" Booklet

The important part dieselization plays in the world's economy today is told in the spring issue of "Power Parade," a booklet issued quarterly by the Detroit Diesel Engine Division of General Motors. A copy can be obtained without charge from the Division's distributors or by writing Detroit Diesel Engine Division, 13400 W. Outer Drive, Detroit 28, Michigan.

Thermostat Used to Increase Water Flow Rate

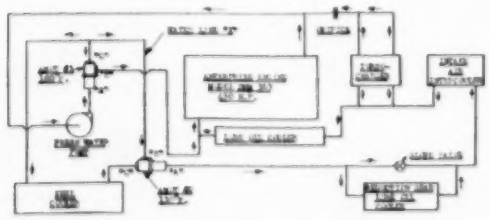


Enterprise model DMM363 marine engine being used in a twin screw application by Calmes Engineering Company, New Orleans.

The photograph shows one of the two Enterprise model DMM363 marine engines recently sold to Calmes Engineering Company, New Orleans, for use in a twin screw application. The diagram illustrates the piping system. The engine is rated at 450 hp. at 900 rpm. and has a bore and stroke of 8 in. by 10 in.

This engine has several auxiliaries that must be cooled with the fresh water and they are as follows: the Young intake air intercooler, the Brown Boveri turbocharger, the Snow Nabstedt reduction gear and the Ross lube oil cooler. The boat is equipped with a keel cooler to cool the fresh water, and it is possible that the fresh water emerging from this keel cooler will be at rather low temperature, depending upon the location, which will determine the sea water temperature.

In the schematic diagram of the fresh water piping system shown, Amot thermostat #1 is the main controlling thermostat, and will maintain a temperature of 180°F. on the jacket water leaving the engine and returning to the pump. Upon starting the engine, Amot #1 will be closed off completely to line "C" and all of the water will go to line "B" and will circulate right back into the engine, and there will be no circulation through the auxiliaries. Because the keel cooler is by-passed on starting, the water will warm up very quickly. At a temperature of 180°F., Amot #1 will pass some water out of "C," and part of this water will go to the keel cooler as the engine will now need cooling. Amot #2 is set to maintain a temperature of 130°F. on the water emerging from "A" going to the auxiliaries. Therefore thermostat #2 will take some of the 180°F. water emerging from "C" on thermostat #1 and will blend it with water coming from the keel cooler, to produce an operating temperature of 130°F. going to the auxiliaries.



Schematic diagram of fresh water piping system.

To understand the function of Amot #2, assume that it is not in the system and that water line "X" on the diagram is omitted from the system by plugging it. Assume that there is just a straight pipe connecting "C" and "A" on Amot #2. Under this system, all of the water emerging from "C" on Amot #1 will go to the keel cooler. Assume that the water emerging from the keel cooler is 80°F. and that the flow through the cooler is 25 gpm. in order to take care of the cooling requirements of the engine. Also assume that the water pump circulates 200 gpm. through the engine. Then 25 gpm. will flow out of "C" on Amot #1, and 175 gpm. will flow out of "B" and will by-pass the keel cooler. The 25 gpm. is a very low rate and will not produce sufficient water circulation to the auxiliaries to do a good job, due to the difficulty of dividing the flows properly and of getting good heat transfer at low flow rates.

Now, by adding Amot #2 to the system to maintain the temperature to the auxiliaries at 130°F., the flow rate to the auxiliaries will be doubled to 50 gpm. With Amot #2 in the system, 50 gpm. will flow from "C" on Amot #1, with the same 25 gpm. flowing to the keel cooler, and with the other 25 gpm. flowing to "B" on Amot #2. Then 150 gpm. will flow from "B" on Amot #1. To put it on a personal basis, Amot #1 thinks that all of the water emerging from "C" is going to the keel cooler; however, Amot #2 is actually robbing half of this water and is putting it back into the line without allowing it to pass through the keel cooler.

The flow rates used in this discussion are not actual flow rates, but are arbitrary values and do not necessarily approach actual operating figures.

Ferry Named Acting Manager in Miami

S. K. Ferry, Sr.

S. K. Ferry, Sr., has been named acting manager of the Miami Beach branch of Florida Diesel Engine Sales, Detroit Diesel Engine Division of General Motors Corporation. He replaces John Huglen who became regional manager for the Cleveland Diesel Engine Division of General Motors' new office in Miami. Ken Ferry joined the Miami branch permanently in 1950 as sales engineer in the marine engine department after a background of 24 years in the diesel engine industry, including engineering and administrative work for Arthur V. Davis, chairman of the board of Aluminum Company of America, and several other firms. He also served in the U. S. Coast Guard and holds a chief engineer's license.

Mr. Ferry will be assisted by Harold Ellis in the service department and George Reynolds in the sales department.

On July 1, 1953 the Miami branch of the Cleveland Diesel Division was changed to Florida Diesel Engine Sales, Detroit Diesel Engine Division. The Miami office handles sales and service for almost all of southern Florida except for Key West.

Inland River Reports

By David I. Day

ON our April southern trip we saw for the first time since rebuilding in 1952 the excellent tug *Walker No. 9*. Near Rosedale, Miss., she was badly damaged by fire and rebuilt at Avondale Ways, New Orleans. This tug 80 x 22 x 9 has neat twin Cooper-Bessemer engines, 1000 hp. Owned by the Baton Rouge Coal & Towing Co., she is presently engaged in off-shore oil drilling operations.

THE new towboat *George W. Banta*, built at Avondale Marine Ways for Capt. J. W. Banta of Plaquemine is doing excellent work. She is General Motors-powered, rated around 1800 hp. We heard that the entire 4-boat Banta fleet is busy. The *Frank W. Banta* has General Motors twins. The *Kishwaukee* has the same sort while the *Atchafalaya* has one 300-hp. Buda engine.

THE *Chas. W. Snyder* of the Pure Oil fleet is one diesel vessel we have seen regularly since we sent in our first batch of river news. She was built at Sturgeon Bay 12 years ago and has not missed much time since. Her triple Cooper-Bessemer provides 1575 hp. Engineers now aboard are Jimmy Mitzell and Art Sowell. When we saw her on the recent trip she was below Greenville with two barges for the Republic Company and had come all the way from Beaumont, Texas.

OUR compliments to the pretty and powerful *Lady Ree*, seen last time on the upper Ohio, this time northbound, passing historic Vicksburg. She has General Motors twins, 1800 hp.

THE U. S. Gypsum Co., Greenville, Miss., has a very useful and economically operated pusher called *Weatherwood*, approximately 90 x 24 x 9, with Atlas Imperial twins, about 800 hp. total. She was pushing three barges filled with pulpwood.

SOUTH of Vicksburg we saw two of our favorite towboats, the *Harriet Ann* and the *L. Wade Childress* — the former belongs to the Upper Mississippi Towing Co., Minneapolis, Minn., and has a nice pair of Fairbanks-Morse engines, 3200 hp. The latter is the property of the Mississippi Valley Barge Line, has twin General Motors engines, around 3000 hp. Both were downbound and running at a creditable speed.

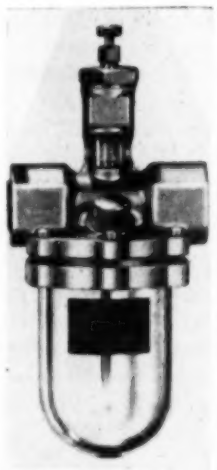
WE WERE somewhat astonished at the number of boats at and around Memphis, Tenn. We were most pleased to see the *Kay D* of the Maxine Transportation Company, one of the first we ever visited back around 1940 or 1941. She looked about as good as new—still using the 800-hp. Fairbanks-Morse engine.

IN MEMPHIS we picked up a letter from Howard A. Burnham with river pictures taken in mid-April at Keokuk, Iowa. The best picture showed the *Donna Lee*—an old-timer using a 1700-hp. General Motors diesel (Cleveland) pushing barges of grain.

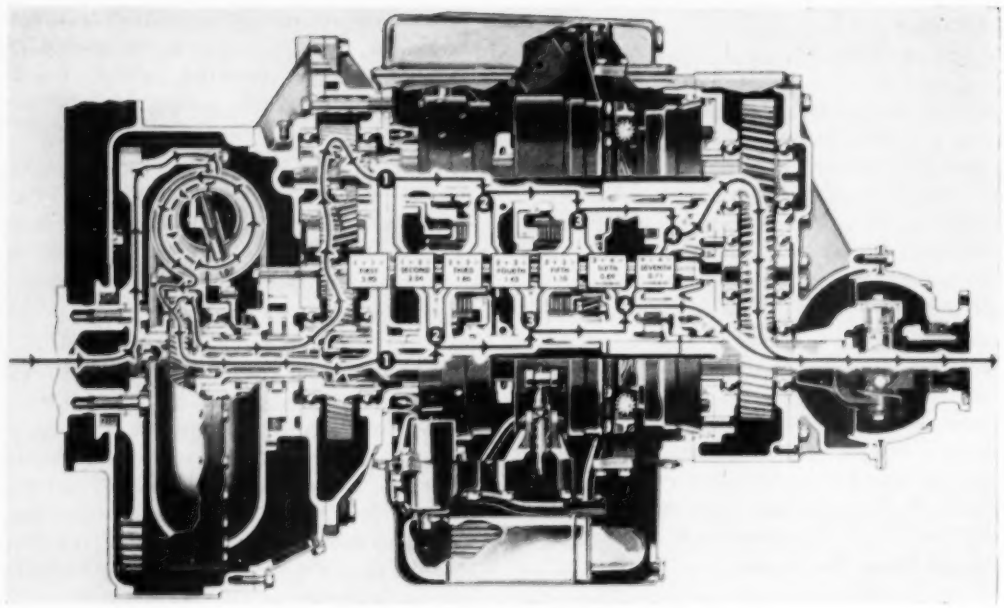
ON THE lower Ohio, upbound was the neat *Bayou Lacomb*, 3600-hp. boat of the Oil Transport Company, New Orleans, using twin Fairbanks-Morse units. In the past, since her launching in 1952, the boat was called the *Casteel* and belonged to C. J. Dick Towing Company.

ENGINEER James Pardue of the *Reba-Jane*, owned now by the Thomas Petroleum Transit Co., Butler, Pa., holds the towboat in high esteem, we understand. We recall this vessel when she was named the *Robin-E* and towed for the Texas Towing Co. She was the first river boat to have been completed at the yards of the Gulfport, Tex., Shipbuilding Corporation. Powered by twin Enterprise diesels, she is rated at 1700 hp. and is one of the best and smoothest operators in swift water we've seen of late years.

Lubricates Oil Starter



An airborne oil fog generated in the Norgren lubricator pictured here is delivered to the air starter of the 600 kw. Sterling mobile power plant described in the May issue of DIESEL PROGRESS. Moving parts of the starter are thus coated with a thin film of oil that helps assure dependable starting. The unit is completely automatic. It operates on the venturi principle over a wide range of flow requirements. The venturi size can be changed to obtain maximum operating efficiency. The Norgren lubricator is a compact unit which requires little space. It features a visible oil supply on transparent bowl types and lubricates only when the air flows. Installation and maintenance is simple. The units come in various models and sizes. They are manufactured by C. A. Norgren Company, 3400 South Elati St., Englewood, Colorado.



Flow diagram of Twin Hydra-Matic Transmission.

Twin Hydra-Matic Secret Disclosed

Inner workings of GMC Truck's new Twin Hydra-Matic transmission for heavy duty trucks is revealed here in a cut-away diagram outlining the power flow. Secret of the new development is a planetary gear set, bolted to the driven member of the fluid coupling, which acts as a differential and operates both upper and lower Hydra-Matic units. The two units are governed to shift independently and alternately with each other, giving seven speeds. Both units are geared together at the rear, driving a single output shaft which is connected by a short coupled universal joint to a 3-speed reduction unit controlled by a lever mounted on the cab floor. The Twin Hydra-Matic transmission will not only decrease driver fatigue, which is an important factor in highway safety, but will insure operating economies through proper gear selections and faster, automatic shifting.

Engine Efficiency Comparison

Interesting figures comparing the operation of butane gas engines with the operation of diesel engines have been reported by the Cardinal Drilling Company of Bismarck, North Dakota. Four butane gas-burning engines on one of the company's rigs operating in the Williston Basin were replaced by two diesels and according to Charles W. Spaulding, drilling superintendent of the company, the new engines increased the average footage drilled per day and also made very substantial reductions in fuel costs.

Believed to be responsible for the increased footage drilled was a greater adaptability of the diesels for heavy duty drilling and the elimination of downtime caused by fuel-freezing difficulties in sub-zero temperatures which was accomplished by the switch to diesel fuel. Although LP gas could be purchased in that locality for about five cents less per gallon than diesel fuel, a 335-gallon daily decrease in the amount of fuel used resulted in a 49 per cent reduction in fuel costs. The figures were based on the operation of two General Motors 6-71 diesels installed over a year ago which had drilled 24,000 feet in 2100 hours at the time of the report. The company is engaged in contract drilling, chiefly wildcating for major oil companies.

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West Coast Diesel News

By James Joseph

TO POWER its mobile log loader, Forest Grove, Oregon's Eliason Logging Company has purchased a General Motors diesel Model 4082 complete with Allison torque converter. Loader is a built-up unit using an International truck frame, Manatowac drums, a custom-built house and heel boom. Soon to go into operation near Detroit, Oregon.

NATIONAL Steel & Shipbuilding Corp., San Diego, California, became the authorized engine parts and service distributor for Atlas and Superior engines in San Diego County on April 1. Service department head is William Haull; parts department is under Harold Emanuel.

AS STANDBY for Northrop Aircraft's main hangar-factory at USAF Plant #42 (Palmdale, Calif.), a SECO diesel electric set from Salyers Equipment Co., Los Angeles. Unit comprises a 275 hp. GM (Detroit) engine directly coupled to a 150 kw. Delco generator.

PETER KIEWIT SONS' CO. has purchased a Caterpillar D-346 156 kw. set.

MADSEN IRON WORKS, INC., Huntington Park, Calif., has sold a D-346 Caterpillar and 156 kw. generator unit to Gibbons & Reed Co.

FOR HIS FISHING BOAT *Sea Lion* Linn Flesher of Newport, Oregon, recently purchased a GM series '51 diesel engine, model 43200RH with 3.5 to 1 marine gear.

HARBOR DIESEL & Supply Co., Coos Bay, Ore., is new GM Detroit diesel dealer under Gunderson Bros. Engineering Corp., Portland. Franchise includes marine and industrial sales, service and parts for Detroit Diesel Engines in Coos and Curry counties. Robert Forrester is Harbor's owner-manager.

TO POWER its mobile crushing plant, Mapleton Rock Production Co., Mapleton, Ore., has installed a GM diesel engine, model 4031C. The GM diesel drives the jaw crusher and truck-mounted Palmer generator.

GUNDERSON BROS. Engineering Corp. recently sold a GM model 12107 diesel engine to Valsetz, Oregon's Valsetz Lumber Co. Unit repowers a yarder, using an Allison torque converter, driving through a Western gear two-speed torquematic transmission.

O'Reilly Named Vice President

Wm. E. O'Reilly

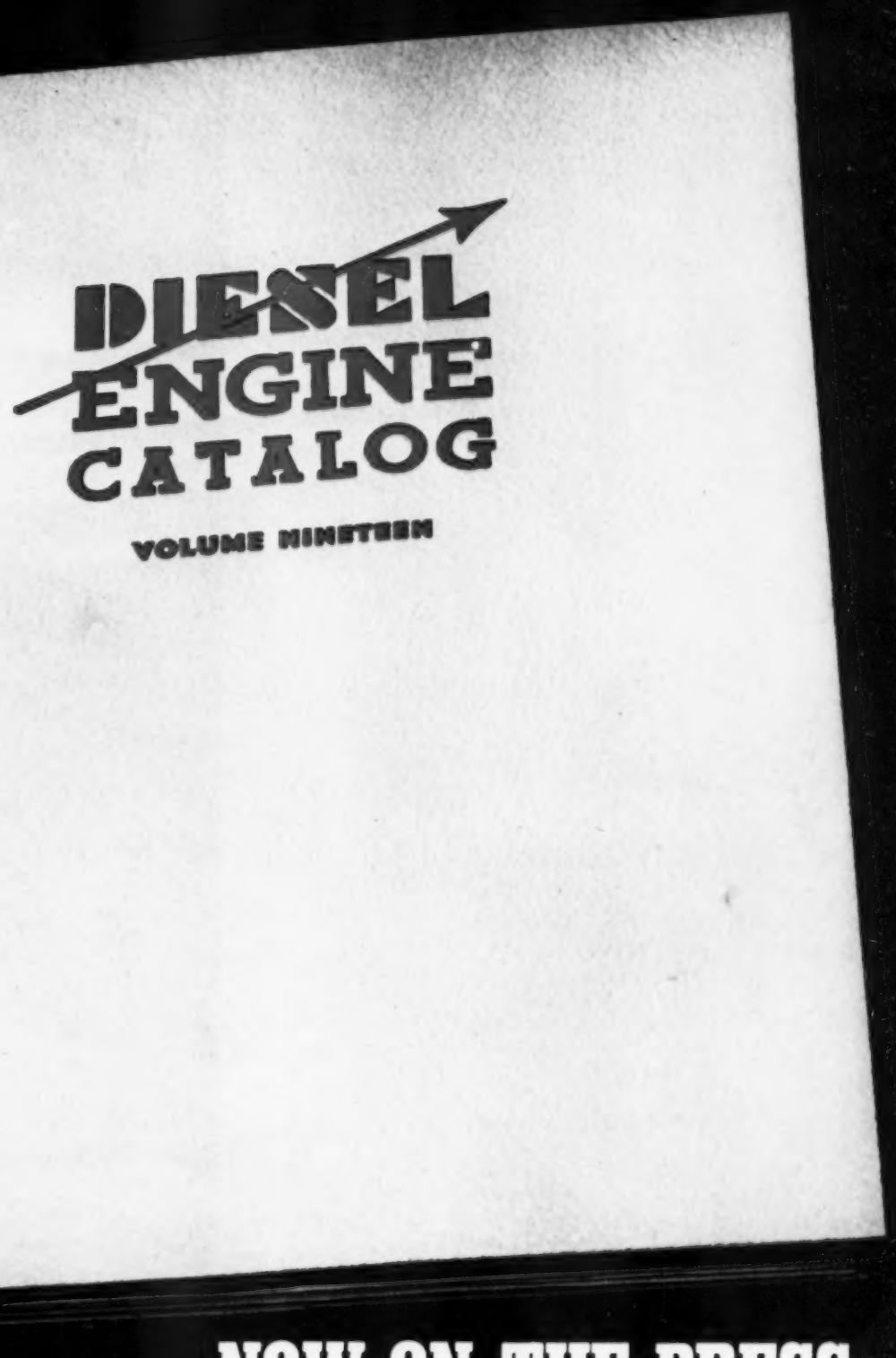
William E. O'Reilly, formerly sales manager for the original equipment division, has been named vice president of the Detroit Aluminum & Brass Corporation, Detroit, Michigan. Mr. O'Reilly has been with the company for 10 years and is widely known in automotive production and engine parts manufacturing circles. He served on the War Production Board and prior to that was with the White Motor Co.

The new vice president is a graduate of Notre Dame and New York University. Detroit Aluminum & Brass, now in its 30th year, manufactures engine bearings for car, truck and tractor producers and also supplies Michigan Hi-Therm bearings to the replacement market from its plants in Detroit and Bellefontaine, Ohio.

Equipment Distributors Convention

The forthcoming convention of Associated Equipment Distributors, one of the diesel industry's most important annual business sessions, is set for Jan. 23-28, 1955 at the Conrad Hilton Hotel in Chicago. The AED, national trade association of the construction equipment industry, drew an attendance of more than 2,500 construction equipment distributors and manufacturers to its 1954 convention in New York City.

ADVERTISERS' INDEX



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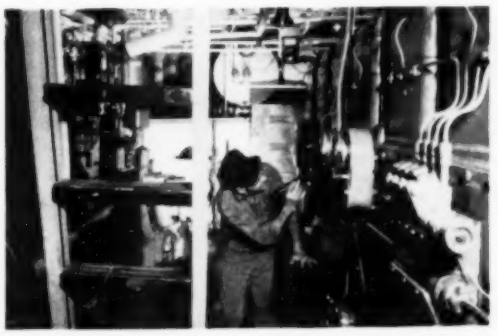
Another example of long service is the Cooper-Bessemer JS-8 Diesel now powering the JUSTINE McALLISTER. Serving a total of twelve years in this and a previous boat the Diesel has never been responsible for a forced lay over due to engine breakdown.

12-Year Performance — *and never missed a tow*

DURING twelve years of tug boat service, the Cooper-Bessemer JS-8 Diesel now powering the JUSTINE McALLISTER has turned in an outstanding record of trouble-free performance. After six years of reliable operation in the now retired wooden tug BARBARA HENGES the engine was purchased by the McAllister Brothers, Incorporated.

Since 1948, the 76-foot JUSTINE McALLISTER, powered by the same 600 horsepower Cooper-Bessemer engine, has been an efficient dependable part of the McAllister fleet which has been operating in the New York harbor area for nearly a century.

What with the year in, year out reliability of Cooper-Bessemer diesel power, combined with effective preventive maintenance by McAllister engineers, the Cooper-Bessemer diesel in the JUSTINE is well on its way to another twelve year performance without missing a tow.



Cecil Green, Chief Engineer on the JUSTINE McALLISTER, checks tappets on the injectors of a 600 hp long-lived Cooper-Bessemer Diesel.

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